DOCUMENT RESUME

ED 207 853 SE 035 733

AUTHOR	Hiltz, Starr Roxanne
TITLE	The Impact of a Computerized Conferencing System on Scientific Research Communities. Final Report. Research Report No. 15.
INSTITUTION	New Jersey Inst. of Technology, Newark.
SPONS AGENCY	National Science Foundation, Washington, D.C.
REPORT NO	NSF-MCS-77-27813
PUB DATE	Jun 81
NOTE	465p.; Not available in paper copy due to marginal legibility of original document.
EDRS PRICE	MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	*Communications; *Computer Oriented Programs; Higher Education; *Information Networks; *Organizations (Groups); Program Evaluation; Questionnaires; Research and Development Centers; Researchers; Science Education; Scientific Research; *Teleconferencing
IDENTIFIERS	*EIES System

ABSTRACT

Presented is a case study of several scientific communities which used a computerized conferencing system (Electronic Information Exchange System--EIES) for a period of two years to enhance their communications and carry out cooperative tasks. Though it focuses on one particular system, it was designed to yield some data that make possible direct comparisons with the results of studies of other computer-mediated communication systems. Specific areas examined are: (1) the determinants of acceptance of this new form of communication; (2) user reactions and preferences related to specific system features and design choices and how these change with experience; and (3) changes in communication patterns, work patterns, and productivity-related measures as a result of using the system. (Author)

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THE IMPACT OF A COMPUTERIZED CONFERENCING SYSTEM ON SCIENTIFIC RESEARCH COMMUNITIES

FINAL REPORT

NSF-MCS-77-27813

STARR ROXANNE HILTZ

JUNE 1981

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RESEARCH REPORT # 15

SE 035 733

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The opinions and conclusions in this report are solely those of the author and do not necessarily represent those of the National Science Foundation.

The author is indebted to Murray Turoff for coauthoring the sections describing the EIES system and for his suppport and encouragement for this study at all stages. Mary Anne Solimine served as a research assistant, supervising the distribution, coding and tabulations of questionnaire responses. Without her diligent efforts, the study would not have been possible. Ann Marie Rabke, Joanne Garofalo, Diane Price, Duchess Brooks, Margaret Wnorowski, Christine Naegle, Sonia Khalil, and Marion Whitescarver provided valuable assistance with coding and data entry and editing tasks. Larry Landwebber was most cooperative in providing access to the Theory Net group. Alan Leurck, Thomas Moulton, and Sanjit Chinai are among those at NJIT who prepared statistical data from information on users recorded by the system monitor.

Among those who have made helpful contributions to the project are Diana Crane, Kenneth Johnson, Peter and Trudy Johnson-Lenz, Elaine Kerr, Ian Mitroff, Nicholas Mullins, Ronald Rice, Julian Scher, and Barry Wellman. Initial interest in the sociology of science was inspired by the work of Robert Merton, who of course bears no responsibility for the directions taken by his student. Last but certainly not least, Fred Weingarten, formerly of the National Science Foundation, has the author's gratitude for his support of research in the interdisciplinary (and therefore controversial) area of computers and society.

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PREFACE

This is a study of several scientific communities which used a computerized conferencing system for a period of about two years to enhance their communications and carry out cooperative tasks. Though it focusses on one particular system, it was designed to yield some data that make possible direct comparisons with the results of studies of other computer-mediated communication systems. Included are an examination of the determinants of acceptance of this new form of communication; user reactions and preferences related to specific system features and design choices and how these change with experience; and changes in communication patterns, work patterns, and productivity-related measures as a result of using the system.

The case study should appeal to those interested in the applications and social impacts of computer-mediated communications systems and their design and evaluation; and also to those interested in the role of communication in scientific research specialties in general, and the relationship between technological innovation and social change in general.

William Whyte (1980,:5) defines a social invention as:

> ...a new and apparently promising strategy designed to solve some persistent and serious human problems. It may take the form of a new organizational structure or a new set of interorganizational relations. It may involve a new set of procedures for shaping human interactions and activities and the relations of humans to the natural and human environment.

Computer-based communication systems, if they live up to the hopes of their designers, are a social invention in all of these senses. This study is an attempt to describe the nature and impacts of one such case history in social invention, the Electronic Information Exchange System (EIES), which had as its objective the enhancement of communication and productivity within scientific research communities.

Whyte's prescription for how a sociologist is to study such an invention was written after this case study was completed. However, it serves to describe the basic approach and objectives well. The sociologist needs to observe and interview the participants...

> Then the sociologist needs to evaluate the effectiveness of the invention. This may involve gathering concrete and material indices of change that can be attributed to the invention as: well as an assessment of the attitudes and perceptions of members of the organization affected by the invention.
>
> But that is not all. The sociologist can make his most distinctive contribution in discovering the theoretical principles underlying the success or failure of an invention... and the characteristics of the social and material environment into which it must be fitted in order to solve human problems. (ibid)

It is the differences in reported impacts and attitudes among individuals and groups using the EIES system that can reveal the most about the conditions under which computerized conferencing can solve communications problems in the sciences and in other areas of human effort where geographically dispersed persons can benefit from collaboration and the exchange of information. Thus, the analytical focus of this report is to describe the important aspects of the experiences of those who participated in the EIES operational trials, and to locate factors associated with significant differences in success of outcome. The study will be a success only if it serves as the basis for better decisions in the future about the design and social implementation of computer systems for human communication.

CHAPTER 1

INTRODUCTION

This is a study of a new mode of communication and of its acceptance by and impacts upon a particular user population: groups of scientists working within the same research specialty. Computerized conferencing systems use a computer to store communications among groups of humans. They can thus exchange ideas and information on a regular basis without having to be in the same place or communicating at the same time.

Among the fundamental characteristics of computerized conferencing as a mode of communication are that:

--One communicates through a computer terminal by typing and reading. Both cognitive and social-emotional exchanges tend to be different than face-to-face communication (See Hiltz, Johnson, Aronovitch, and Turoff, 1980).

--Communication is "asynchronous"; sending and receiving may occur seconds apart, or days or even years apart.

--The computer's memory can be used to store and find communications and information; one can therefore retrieve stored material by attributes such as topic. One can also filter one's communications, deciding whether, when, and how thoroughly to choose to read items from the mass of material to which one has access.

--The computer can be programmed to provide a variety of communication structures and services, such as tabulation and display of votes, or analysis and display of information according to a format specified by a particular individual or group (See Hiltz and Turoff, 1978, Chapter 9).

The first computerized conferencing system was designed and implemented in 1970 (See Turoff, 1972). There are now hundreds of systems which use the computer to store and mediate human communication, most of which are very simple message systems or Community Bulletin Board Systems. The Electronic Information Exchange System (EIES) is a computerized conferencing system which was originally designed specifically to enhance communication within geographically dispersed "small research communities" of scientists, "conceived as groups of 10 to 50 individuals sharing an interest in a scientific or technological problem area" (NSF 76-45:3). EIES provides a message system which enables members to send private communications to individuals or groups on the system, "conferences" which build up a permanent transcript on a topic of discussion, and notebooks where scientists may use text processing features to work on jointly authored reports. It also provides the capability to create special structures to handle unique kinds of information or knowledge bases, or to change the interface, or conduct a controlled experiment. For example, one of the scientific groups in this study had capabilities designed for them to produce an "electronic journal." Another group had software designed to facilitate inquiry-response exchanges that followed a selective tree-like structure rather than the linear transcript structure of the regular conference system (See Johnson-Lenz, 1981).

The Division of Science Information (now the Division of Science and Information Technology) of the National Science Foundation issued a program announcement in 1976 inviting proposals for "operational trials" of EIES. Four groups were chosen to participate beginning in late 1977; three final groups were chosen in 1978. In addition, several other groups made use of the EIES system with DIST permission, but without DIST support.

The official objectives of the Operational Trials program were:

--To test the hypothesis that EIES can enhance the effectiveness of individuals belonging to such a community.

--To accumulate practical experience with EIES by the members of such a community.

--To gain deeper insight into the relationship between communication processes and the progress of science and technology (NSF-76-45:.3)

The Division of Mathematical and Computer Research funded a study by the author of this report to conduct an cross-group assessment of the impact of the use of EIES, with the following objectives:

--Feedback to the designers on user reaction to specific features of the system

--Isolation of the factors accounting for low vs. high levels of use

--Identification of the individual and group impacts of the system on those who do make substantial use of it.

It was hoped to make the study comparative across systems. One other scientific user community on MACC-Telemail, theoretical computer scientists, did agree to participate. However, response rates from that group were fairly low. A brief description of that system and the results for the Theory Net group will be reported in a separate chapter. In addition, indirect comparisons to the PLANET and NLS systems are made possible by using some of the same questions for users that had been employed in earler studies of these systems.

In this introduction, we will look at previous findings about scientific communication which formed the basis for the variables examined in this study. We will also include a more detailed overview of the EIES system which served as a context for most of the data collected, a summary of the nature of the scientific user groups, and a description of the evaluation research methods used.

THEORETICAL FRAMEWORK AND INITIAL HYPOTHESES

The model of analysis begins with several "input" or independent variables: characteristics of the individual user; of the scientific user groups and the tasks they undertook on the system; and characteristics of the system itself. This framework was initially developed by Jacques Vallee and his colleagues at the Institute for the Future (Vallee et al., 1974:22) in their evaluative work on the PLANET computerized conferencing system. It is described in detail in the final report on another project which was undertaken concurrently with this one (Hiltz and Kerr, 1981). Among the characteristics of individuals which were measured are skills (such as typing and previous computer experience); initial attitudes toward the system they were invited to use; patterns of communication and exchange with other scientists in the specialty; and access to computer terminals. Among the important characteristics of the group are its size, cohesiveness, leadership, and the nature of the task it is trying to accomplish through using the computerized conferencing system.

The system itself has characteristics such as ease of learning, the nature and quality of documentation and training help offered to users, the "friendliness" of its interface, and the nature and variety of capabilities which it offers. (See Hiltz and Kerr, 1981, Chapter 2, for a complete review of the variety of system characteristics and their relative importance for user acceptance). As a result of the interplay of individual, group and system attributes, individuals make choices about whether or not to use the system at all. Some become dropouts; some become "addicts" who spend several hours a day working and communicating on line. Through systematic feedback, the system itself undergoes change. The individual and user groups also change, as a function of how much they use the system. This study collected data over time which could be used to track this complex process. Subsequent chapters will include discussion and review of the literature on individual, group and system attributes which seemed to have important influences on the nature and degree of impact of EIES.

The sections which follow summarize the research which was used in conceptualizing the potential effects of the use of EIES upon scientific research communities. They are drawn from the original proposal to the National Science Foundation, and represent the background for and justification of scientific research communities as the initial population for a study of the potential impacts of computerized conferencing systems.

Characteristics of Scientific Research Communities

A. SCIENTIFIC COMMUNICATION

Scientific specialties consist of a set of scientists who engage in research along similar lines and who communicate often and intensively with one another (Hagstrom, 1970: 91-92). As Chubin (1975: 1) has pointed out, "disciplines form the teaching domain of science, while smaller intellectual units (nestled within and between disciplines) comprise the research domain."

Such specialties have sometimes been called "invisible colleges" of scientists (Price,1963; Crane, 1972) and have been seen as the social location of technical, cognitive, and ethical norms (Mulkay, 1972; Mitroff, 1974a) and as internally stratified on the basis of productivity (Cole and Cole, 1973).

Geographically dispersed networks of scientists working in the same specialty area can be viewed as the prototypical "production organization" of science, in which the "product" is scientific knowledge, and the social organization depends almost entirely upon the communication system. Not only do the formal and informal communication system serve to direct and redirect efforts to "important" areas and the most fruitful methodological tools, but they also reinforce shared norms and theories and allocates rewards in the form of recognition.

Cole and Cole (1973:16) describe the importance of communication in science as follows:

> "Scientific advance is dependent on the efficient communication of ideas. The communications system then is the nervous system of science; the system that receives and transmits stimuli to its various parts."

The actual processes through which this crucial formal and informal communication takes place have not changed in decades except that in many disciplines, an exponential growth has slowed down the process and lengthened the time between the completion of a research project and its publication in a journal. Summarizing the results of a series of studies of scientific communication in the discipline of psychology, which is similar to patterns in many other disciplines, Garvey and Griffith (1971: 354, 355) conclude that the scientist relies heavily on informal networks of discussion, small meetings, and exchange of drafts and preprints to keep abreast of current activities and of the current views of the community on the value and relevance of specific research problems. The journal article, by the time it is published, lags so far behind the research frontier that its functions are mainly to inform scientists in other specialties, and to allocate recognition for scientific achievement.

Increasingly, there have been calls for improving scientific communication and information dissemination. Many of these have focused on the information storage, processing, and networking capabilities of the computer to provide assistance.

Some of the suggested innovations deal with the formal communication channels, the professional meeting and the journal. There are estimates that there may be 100,000 journals published in 1980; something must be done to decrease the costs and increase the efficiency of dissemination of "published" results. Selective dissemination of articles only to consumers who peruse computerized abstracts and order a copy of the full paper has been one answer; another has been more efficient, computer-assisted publishing procedures (See Rhodes and Bamford, 1976).

Another approach has been to make scientific information, particularly in the form of data bases and bibliographic files, directly available to researchers through an on-line, interactive computer system. One example of this is the NIH-EPA Chemical literature.. on a central computer which can be accessed from telephone-coupled computer terminals anywhere in the world. The user searches and retrieves information and performs data analyses on these files through conversationally-designed computer programs. (See Heller, et al., 1977). Scores of abstracting services have also been computerized and programmed to allow a person to interact with a computer to search these files using combinations of key words.

However, the informal, pre-publication communication within scientific specialties is also crucial to increasing scientific productivity. Recognizing this, the Division of Science Information of the National Science Foundation financed the building and field testing of EIES as a computer-based communication system designed specifically to meet the needs of networks of geographically dispersed scientists.

B. POTENTIAL IMPACTS OF COMPUTERIZED CONFERENCING ON COMMUNICATION AND PRODUCTIVITY

It was hypothesized that there would be some very marked effects of the use of computerized conferencing upon the scientific specialties which utilize it. Consider that existing communications structures are either very slow (printed journals), very fitfull and expensive (yearly conferences or special meetings), or very exclusive (personal letter, personal visit or telephone call). Computerized conferencing could enable the members of a user group to keep in constant communication with one another and to exchange ideas and findings on a daily-to-weekly basis, sending and receiving such materials at their own convenience. It could increase the amount and timeliness of the raw materials (information and ideas) used in the scientific process and thus increase the productivity of scientists.

C. IMPACT ON DEVELOPMENT AND RESOLUTION OF SCIENTIFIC CONTROVERSIES

We were especially interested in studying the impact of computerized conferencing upon research specialties in which there are some basic theoretical conflicts or controversies, with the competing theories each having their adherents. Often this will occur when large amounts of new data or new types of data are becoming available.

Studies by distinguished analysts of science such as Kuhn, Merton, and Feyerabend have established that controversies are a perpetually recurring, if not permanent, feature of science. Such studies also establish that controversies are a vital feature of science in the sense that science is fundamentally dependent upon them for the introjection of fresh points of view and the challenging of old established beliefs. In other words, it is expected that in the natural course of development of science that scientists of different "schools" of thought, theoretical persuasions, points of view, and disciplines will develop different hypotheses with regard to the same phenomena. It is also to be expected that some of these hypotheses will clash sharply, since they are frequently based on different ideologies (see Robbins and Johnson, 1976). For this reason, scientific groups are especially likely to be affected by the use of computerized conferencing if they are about to experience sharp clashes of opinion within the particular group or the discipline as a whole with regard to an important problem area of concern.

One can imagine the emergence of a new paradigm as a kind of Hegelian process. A new theory or method may arise to challenge the existing dominant approaches. There may be a period of increased controversy as the two sides argue. Then the controversy may be resolved by some sort of synthesis of opposing points of view.

D. IMPACT UPON THE OVERALL STAGE OF DEVELOPMENT OF A SCIENTIFIC SPECIALTY

Related to the development of scientific controversies, it was hypothesized that there will be a differential impact of the intensified communications made possible by computer conferencing upon scientific research communities, depending upon the stage of development of the specialty when computerized conferencing is introduced. Thomas Kuhn has formulated widely used ideas about the nature of the differences among the sciences, which begin with the premise that a fully developed specialty area has a fully developed and fully shared "paradigm." In the study this is tapped by questions referring to whether or not there is an "intellectual mainstream."

Following the analogy of the Hegelian dialectic one can hypothesize that the first step in the development of a shared paradigm or a new paradigm is the sharpening of methodological or theoretical controversies. The second stage might be their resolution or "synthesis" into a new "paradigm" or "mainstream." One would not expect such a full cycle to necessarily be completed in eighteen to twenty-four months. Thus, this study looks for both parts of the hypothesized process: the clarification of controversies and their resolution.

Among the other specific questions related to growth and change in a specialty which can be explored is whether a C.C. system can increase the motivation or probability of a scientist's contributing ideas for a piece of work which another scientist has in the formation stage.

A standard view of motivation in science has the scientists exchanging "gifts" of published results for the reward of recognition.* One of the norms of science is that once something has been published, those who use it are supposed to acknowledge its source. Informally "helpful" information, typically exchanged at conferences or in conversation, however, frequently is not acknowledged; possibly because the scientist who received the insight or advice forgot its source. EIES provides the date and time and a written record of all suggestions or advice; thus it might become easier and much more expected that the recipient of such material will acknowledge its influence when the results finally are published. The greater probability of this formal recognition for such contributions to the research of others would, in turn, increase the motivation to engage in the activity.

On the other hand, it may be that scientists will be very reluctant to make detailed suggestions about the research projects discussed by others, because of the lack of apparent reward for doing so; or to enter their own research plans and problems, for fear that they may be "stolen" and published by someone else.

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*See for instance, Hagstrom, 1965 and Storer, 1966. Nicholas Mullins has pointed out that perhaps if the metaphor is to be applied at all, it is more like a potlatch or a frenzied feeding of sharks than a polite exchange (private communication).

E. THE SOCIOMETRIC STRUCTURE OF SPECIALTY AREAS

Another area of inquiry is the impact of conferencing systems upon the size of the specialty. In regard to the size of the group of actively communicating and working scientists within a specialty, for example, will computerized conferencing condense the research specialty, so to speak, into a smaller core group, with those not in the system more completely cut off? Or, will the increased ease of communication within this core facilitate expansion through circulation of some of the printed output, invitations to "observers" or "visitors" to occasionally take part, the freeing of time to do more letter-writing and manuscript circulation to more people, and/or the facilitation and inspiring of specialized face-to-face conferences to which a general invitation is extended?

Scientific research communities are not only networks of communication, but are also stratified social sysyems which allocate prestige and opportunities. For example, as Price and Beaver (1969:101-117) describe their concept of invisible colleges:

> The basic phenomenon seems to be that in each of the more actively pursued and highly competitive of the sciences there is an "in-group." The people in such a group claim to be reasonably in touch with everyone else who is contributing materially to research in this subject not merely on a national scale, but usually including all other countries in which that specialty is strong. The body of people meet in select conferences (usually held in rather pleasant places), they commute between one center and another, and they circulate preprints to each other and they collaborate in research. Since they constitute a power group of everyone who is really somebody in a field, they might at the

> local and national level, actually control the administration of research funds and laboratory spaces. They may also control personal prestige and the fate of new scientific ideas, and intentionally or unintentionally they may decide the general strategy of attack in an area.

Two interesting inadequacies of the "invisible college" structure are immediately obvious. First, for those who are "in," the existing communications network is so time-consuming, sporadic and slow, that only a few of the many questions, answers and comments that might fruitfully be exchanged actually are. Secondly, what about those potentially productive scientists who are "out"? An analysis of productivity patterns of chemists (Reskin, 1977:441)) suggest that "collegiate recognition is particularly important for chemists in contexts that that do not stress scholarly publication."

A computerized conferencing system might make the exchange within "in" groups more effective. It also could allow the rapid formation of communities that do not now exist. A group of younger unknown researchers could form their own peer group independent of the "established" in-group. Moreover it could allow new modes of interaction between "elites" and "newcomers" (see Mulkay, 1976, for one view of current relationships).

Thus an issue of interest is the question of which types of scientists can be most aided by such a system, those who are already part of a highly productive elite within a specialty, or those who are currently cut off from opportunities for extensive communications and cooperation with others in the field. At present, the academic community is very much a stratified one, with those scientists located at the top universities having a much greater opportunity to be productive and gain recognition, because more time, money and equipment is available for research, and because of the greater likihood that their academic affiliation will automatically include them in an existing communication network. This is an example of what Merton (1968) calls the "Matthew Effect" in science, quoting from the Book of Matthew: "For unto everyone that hath shall be given, and he shall have abundance: but from him that hath not shall be taken away that which he hath."

Allison and Stewart (1974) have used cross sectional survey data to provide evidence that at least for chemists, physicists, and mathematicians, getting off on "the wrong foot" can severely lessen the opportunity to ever have the contacts and resources to be "productive" in terms of research. They summarize their findings as follows:

> The highly skewed distributions of productivity among scientists can be partly explained by a process of accumulative advantage. Because of feedback through recognition and resources, highly productive scientists maintain or increase their productivity, while scientists who produce very little produce even less later on. A major implication of accumlative advantage is that the distribution of productivity becomes increasingly unequal as a cohort of scientists ages. (p. 596)

It is possible that a computerized conferencing system can provide equality of opportunity among research members located at "small" colleges who are "unknowns," with those at major institutions. It is also quite possible that the researchers at small institutions would benefit more in terms of productivity by the increased stimulation due to improved peer group communications.

To examine these issues, the study includes some pre-use measures of productivity and of how well known the scientists are (subjective assessments). These will be looked at in terms of their relationship to amount of use of the system and to subjective reports of the impact of system use on productivity and on the resolution of theoretical or methodological controversies.

THE STRUCTURE OF EIES

EIES provides four general purpose structures for all its users:

- MESSAGES: The delivery of messages to individuals and/or defined groups. This facility includes confirmations of delivery, a central message file, editing, retrieval, searching and resending, as well as historical analysis of message traffic by individuals.

- CONFERENCES: Linear time sequential transcripts of group discussions on a particular topic with status information on readership. This facility includes voting, text searches, automatic delivery of new material to individual conferees and other communication support functions. Descriptions of open conferences are listed in a public conference, and an individual may join any number of conferences.

- NOTEBOOKS: A text composition and word processing space that may be private to an individual or jointly shared among a group of users. Provides features for organizing and distributing documents as well as automatic notification to users of edits and modifications.

- DIRECTORY: A membership directory containing both individuals and defined groups with self entered interest descriptions and numerous search options. A defined group may be treated as a single individual for purposes such as sending a message.

Messages are either private or group messages, and conferences and notebooks may either be private, group or public. Private conferences and notebooks are controlled by an individual user who determines the participants. Group conferences and notebooks are controlled by defined groups on EIES, while public conferences or notebooks are available to anyone on the system for reading. Public notebooks have a defined set of authors (restricted writing), but anyone can read in them.

All the text items in the above subsystems are compatible and readily transferable, i.e., a message may be transferred into a conference comment or notebook page. All of the subsystems exist within the context of a single user interface that provides four different modes of user interaction. The user interface modes are:

- MENU SELECTION: the user selects an option from a list included on the one-page guide to the main set of EIES menus.

- COMMAND DRIVEN: all the menu selections are available as commands. In addition, approximately 200 advanced features not available in the menus can be utilized.

- ANSWER AHEAD AND COMMAND STREAMS: The user can anticipate questions and answer ahead or trigger a sequence of operations. The EIES interface is fully predictable to the user and all commands are usable at any point in the interaction.

- SELF-DEFINED COMMANDS: the individual user or a group coordinator can define commands unique to the individual or group. There are facilities for defining commands that will accept input control at the time they are executed.

In addition to the above, EIES has a general purpose language (INTERACT) that can interpret any input stream from a user or from EIES as an executable program. INTERACT programs are stored in EIES text items. This capability allows selective tailoring of the interface and communication features of EIES by individuals or groups. With INTERACT, specialized subsystems are tailored for specific applications. Access to a specific EIES program is given by readership privileges on the text item in which it is stored.

EIES operates on a dedicated mini-computer--an INTERDATA 7/32 with half a megabyte of core and two 300 megabyte disks. It currently supports up to 32 simultaneous users. EIES is implemented in FORTRAN, with modifications to the compiler and to the executive system. It is accessed either by a direct telephone call, or through the TELENET packet-switched network. TELENET had nodes in approximately 185 U.S. cities during the period of this study; the cost was $3.75/hour to connect to EIES from any of these nodes.

Within the basic structure of EIES are many specific system features.

Many of these have been subjected to user evaluation, reported later. Table 1-1 provides a brief description of various system features and indicates which have evolved over the operational period of the system from late 1976 to 1980. The fact that the system was constantly evolving, partially as a result of feedback from this study, greatly complicated the problem of getting comparable data from users and user groups who joined the system at different times.

TABLE 1-1

BRIEF EXPLANATION OF EIES FEATURES

FEATURES IN THE ORIGINAL DESIGN

(An * indicates the feature has undergone extensive additions or modifications over the four year operation of the system)

Private Messages: Can be sent to any individual or list of individuals. Confirmation of date and time of delivery is given.

Group Messages: Delivers the message to all members of a pre-defined group. No confirmations are provided, but sender can request status list showing who has received it.

Membership Directory: Self-entered short description and address for all groups and members. Specialized searches are incorporated.

Private Conferences: Any member may initiate and moderate a conference on any topic. Member has right to involve whatever participants he/she chooses and decides whether or not to advertise.

Group Conferences: Each Group has a permanent general conference to which all group members belong.

Public Conferences*: Conferences in which anyone on the system may read or write without having to be granted access.

Private Notebooks*: Each member has a notebook for composing and storing items. The owner of a notebook may give other members privileges to either read only or write as well. Owners may also establish read-only windows to portions of the notebook. New items as well as modifications of existing items are reported to all members in a notebook.

Group Notebooks*: Same features as private notebooks, but associated with all members of a group.

Public Notebooks*: Anyone on the system may read in a public notebook, but only the designated authors may write in the notebook.

Menus: The standard form of person-machine interface taught to new users via the written documentation they initially receive.

Commands*: System-wide commands allowing the complete replacement of the use of menus and adding other unique capabilities outside those available through the menu.

Explanations: An on-line searchable file containing specific explanations of all system features.

Retrieval: The ability to recall any text item previously read by a unique identifier. For messages this is limited to the last 30,000 sent on the system (about three months' traffic) and for conferences or notebooks this is based upon owners of these spaces deleting items when they are outdated.

Searches*: Messages, conference comments and notebook pages may be searched by author, editor, dates, item identifier, free key words, full text, associations among items in either a nested or combination process.

Anonymity & Pen Names*: Any text item may be signed anonymously or with a unique secret pen name. Messages may be sent to pen names.

Synchronous Conferences: The ability to hold a conference when all members are on line at the same time by supplying status indications of everyone's position in the conference at any time.

Voting*: The ability to choose any one or two of nine alternative voting scales that can be attached to a conference comment. The computer collects and displays the vote distribution for the members of the conference.

Direct Text Edits*: A line-oriented editor for use in the scratchpad, where individuals compose text items for entry into the system. Edits are accomplished immediately.

Copy, Get and See: Methods of indirectly referencing other items of text within a given text item or of transferring text items among messages, conferences and notebooks. In the case of 'See,' the printout of an item is conditional on whether the receiver has already seen it.

Table 1-1, Cont.

EVOLVED FEATURES (Those added to the EIES system based upon feedback from users)

User Consultants: Volunteers who help others to learn to use the system and who also serve as information brokers on activities taking place on EIES. A number of special - purpose software features exist to facilitate the tasks of the user consultants.

CHIMO (newsletter): A weekly summary of events taking place on EIES.

? or ??: Entering a ? or ?? as an answer to any question or choice on EIES results in a short or long explanation, respectively.

?word: Will retrieve an explanation of the "word" or system feature named from the explanation file.

SEN, ??? or LINK: Sending one-line messages which are delivered the next time the recipient does a carriage return, with or without confirmations or continuous exchange of one-liners with a group.

Defined Commands: Any user may define a sequence of operations or commands as an individually tailored command. Facilities exist for the more sophisticated user to make these conditional.

Indirect Edits: Edit commands stored within the text providing such things as centering, paging, text justification and tabulation. Indirect edits are executed at output time and are based upon the specifications the receiver has indicated for his or her terminal or local interface device.

Storage Areas: A set of six temporary scratchpads in which users may store fragments of text undergoing composition.

Terminal Controls: The ability of a user to control margins and page size.

Switches: Special controls needed to regulate the output for those interfacing through microcomputers and intelligent terminals.

Reminders: A personalized file of one-line reminders kept by any member which may also be "alarmed" by date and time.

Interests: A file of key words such as "ham radio" which users may enter and associate with so that messages can be sent to all those on the interest list.

Submit & Read: The ability to provide abstracts to others via messages or conference comments which are active keyholes, upon demand, to larger documents stored in notebooks.

Subaccounts: The ability of a group of users to share a single membership slot where only one of the group may be active at any one time.

Games: Various computer games incorporating the ability of players to contribute material to the game or having a communication component (e.g. bridge).

Graphics: The ability to specify simple diagrams through a size independent specification of figures, together with an ability to move windows around in a text item and insert text in windows horizontally or vertically.

Special Programs: Tailored routines for specific purposes. For example, "Terms" collects votes on alternative definitions for tasks such as standards setting. "Respond" administers surveys with multiple choice questions.

Special Communication Interfaces: Tailored communication structures such as TOPICS to deal with Inquiries and Responses within a group and allow members to set profiles of their interests for self-filtering of the incoming material.

INTERACT language: A programming language allowing the imposition of special communication or data structures on the basic EIES facility.

DATA SOURCES AND METHODOLOGY

Three sources were originally planned and have been utilized. In addition, three data sources have been devised using the unique capabilities of EIES. All participants in the study were fully informed about the purpose of the study and the data that would be collected. Formal "informed consent" agreements were obtained, as required by federal guidelines for the protection of human subjects.

1. Mailed Questionnaires. These each took twenty to thirty minutes to complete. They were sent out "pre-use," with a first follow-up at three to six months and a second follow-up at eighteen months. The latter is referred to as the "post-use" questionnaire, even though most participants continued their use of EIES for some time after completing it. Many variables can thus be examined through changes in responses to items repeated on the questionnaires at two points in time. The questionnaires and marginals for responses are included in the Appendix.

2. EIES monitor statistics on amount and type of use. These have been obtained monthly, with the cumulative totals achieved at several points in time incorporated into the questionnaire data file for cross-tabulation.

3. Participant observation. Transcripts have been collected of more than 120 conferences, including some with over 1000 entries. These qualitative observations have been useful in providing an understanding of what the user groups actually did on the system.

The role played might be described as "observer as participant;" the scientists knew that the author was observing for evaluational purposes. As a form of reciprocity, the observer offered to be of assistance whenever possible. A passive role was played, with comments entered by the participant observer generally only in response to a direct request for information or an opinion. Many participants also shared their reactions to the system in private messages to the evaluator, and played the role of informant, describing or calling attention to activities and exchanges on the system which they thought would be of interest in the study.

In addition, unstructured face-to-face interviews were conducted whenever possible with the principal investigators and/or evaluators of the groups being studied.

4. A routine was adapted to enable EIES to administer and tabulate the responses to short on-line questionnaires. This is reported on in an article in the Winter 1979 issue of the Public Opinion Quarterly. In addition, the system was used to provide reminders and thank you notes to respondents to the mailed questionnaires. Examples of these are included in the Appendix.

5. Since users are requested to send a message to "Help" (the user consultants on EIES) about any problem they have with the system, a file was created which logged all these requests. This file was analyzed every one to three months, and served as a basis for much of the "formative" evaluation which provided feedback to the designers about aspects of the system which could be improved, on the basis of user experience. Examples of the lists of problems generated through

the user consultant file are included in the Appendix.

It should be noted that the user consultants were instructed to remove any material of a personal or private nature and to file only questions and comments received that related to the system. EIES members were also informed that their questions to user consultants would be stored in a central file.

6. A file was created of the "who-to-whom" matrix of private messages sent, aggregated weekly. This was done for the first eighteen months. The resulting data can be used to study the evolution over time of the network of social relationships. The confidentiality of such data is protected by removing the identifying information through a computer routine which substitutes a random number for the "real" user ID. For this study, only some preliminary analysis of changes in the size and density of the communication networks over time will be done. The file will then be made available to other network analysts for more complete social network analysis. This social network analysis will be the subject of a separate paper, to be co-authored with Ronald Rice.

Methodological Difficulties

A long term panel study always has problems with "mortality" among the respondents. In addition, the needs of evaluators always tend to conflict with the priorities and needs of the organization/system being studied. Both of these problems affected this study.

In addition to the usual problem of respondent mortality because of a

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decline in interest or moving, this study was plagued with very high turnover in EIES membership during the eighteen months. The research design pictured about 150 EIES members beginning use of the system in a particular month, and continuing to use the system for eighteen to twenty-four months. In fact, users straggled onto the system. For instance, some core members of groups 30 and 35 began use of EIES in September, 1977. Groups 35 and 45 were to begin in January, 1978, but problems with delivery of terminals, user materials, paper, etc. meant that many did not actually sign on until the end of February. As a result, it was not possible to find a date when a group could be said to have used the system for three months, which was the originally planned target for the first follow-up questionnaire. The first follow-up was thus sent and completed sometime between three and six months after the date of first sign-on to EIES.

A more severe problem was turnover of users. Some of this was done informally-- a person simply gave their ID to somebody else, and the EIES staff was informed later if at all. Some of it was done purposefully by group leaders, who weeded out inactive members and replaced them with new prospective members. In the latter case the notification of such deletion and replacement frequently did not filter through to the evaluation team and resulted in the absence of a pre-use questionnaire being sent at the proper time. Thus, the number of pre-use questionnaires is the lowest of all. If a person was deleted from EIES, they might complete a short follow-up questionnaire, but they were not eligible for a post use questionnaire, since they were not on the system for a long enough time. The end result of these problems is that the number of persons for whom we have a complete, three questionnaire longitudinal record is much smaller than the number for whom we have any one questionnaire. A second result of the rotating bodies through the same ID's is that very careful watch had to be made to modify the EIES ID when assigning questionnaire ID's. For instance, assuming there was more than one person with the ID of 300, then the first one was labelled 1300, the second 2300, the third 3300, etc. There are undoubtedly a few errors where the "wrong" person's questionnaires and monitor data are being matched for particular points in time, although we spent a great deal of time trying to clean the data of such errors. A related problem is that "3-6 months" and "18 months" are very rough descriptors for the time of data collection. A few respondents had been active somewhat longer than the target figures at the time they completed a questionnaire, and many for a shorter period of time.

Further difficulties were encountered with the monitor data. Detailed specifications were worked out for the type of data and automatic statistical analyses that were desired. However, the person responsible for this simply did not do the job. As a result, only fairly limited monitor data are available, and all summary and analysis had to be done by hand.

Still another source of difficulty was that the user groups obtained an extension of six months to a year in their use of the EIES system. Meanwhile, this study had been budgeted for only eighteen months. In fact, the most addicted or committed members are still on line (as of Summer, 1980), more than six months after the official end of the operational trials. They managed to find the funding somewhere. This totally destroyed the plans for a potentially interesting study of "ex-addicts." The plan had been to study the nineteen heavy users in this study who were to lose their memberships. The addicts, following their own needs and priorities, refused to become "ex-addicts" and the study could not be conducted.

The most severe of the methodological problems, of course, is the problem of "going native." In order to understand the use of EIES and its evolving electronically based social system, and to remain in communication with the subjects, it was necessary to spend a great deal of time on line. More than 3000 hours on line have been logged in the course of this study. Thus, the objectivity afforded by "outsider" status was long ago lost.

The main solution to the "going native" problem is that the data presented and interpretations made stay as closely as possible to objective evidence supplied by the participants themselves-- monitor data on the amount of use, questionnaire responses, excerpts from conferences and messages on EIES. In other words, this report tries to summarize what the objective data say, and to minimize as much as possible any acquired biases of the participant observer.

Methodological Weaknesses of the EIES Field Trials

The EIES project was a unique approach to studying factors relating to the organization and productivity of scientific specialties: actually changing the communication modes of several specialties, and then figuratively sitting inside the communications network to observe what happens. It is recognized, however, that this field experiment distorts and fails to measure what might actually occur should computerized conferencing become a "normal" widespread, nonexperimental mode of communication.

1. A New Technology is Limited to a Few Groups

One analogy that might be made is to the situation when telephones were new and owned by only a few persons. Just as people used to have to shout to be heard over long distance and much static was commonplace, a few technological kinks in the system, which may discourage and frustrate users, can be expected in the beginning.

Secondly, the scientist-users had to resort to other communication modes for other roles they play and their associated communications. Eventually, terminals in the home and the use of computerized conferencing might become as cheap and widespread as TV ownership is at present. At that point, people could belong to many "conferences," corresponding to all their roles--a family news conference, for example, and a chess conference. For the duration of the field trials, however, only the approximately 300 scientists on the system were able to be reached by computerized conferencing. As a result, use of the system was added on to use of other communication modes rather than replacing much of their use. A related factor is that for system planning purposes, the specialty group's ability to expand to include new members on the system was arbitrarily limited. If computerized conferencing were a generally available service like the telephone, any number of additional persons might join the network. Still another factor related to the newness and scarcity of the technology is that many of the scientists never before used a computer terminal and might not have had any other use for it; thus, the investment of time to learn the system might be problematical. Since users did not generally have a terminal both at home and in the office, they had to take the trouble to carry it around if it was to be available at all times. If the day ever comes when terminals are as omnipresent as TV's, they will always be conveniently at hand without foreplanning, and used with as much frequency and ease as more familiar household appliances are now.

2. The Hawthorne Effect

The scientists in this study knew that they were being observed. They also knew, from questionnaires they received and announcements of the project, what variables were being watched. This awareness may have affected their behavior. They may have been self-conscious about what was entered into the system, knowing that "big brother" evaluator was out there somewhere reading the transcript. They may have deliberately distorted their questionnaire responses to tell the evaluator what they think she wanted to hear.

3. Long Term Effects

In current experimental situations, scientific groups are only given access to EIES or other computerized conferencing systems for a year or two. However, the development of a new scientific concept or the transition from hypothesis to proven "fact" may stretch over time frames of a decade or more. In addition, short-term recognition of the value of a contribution tends to be conferred by peers within an invisible college, but long-term recognition is more likely to be determined by users from outside the sub-speciality.

PARTICIPANTS IN THE STUDY:

GROUP AND INDIVIDUAL CHARACTERISTICS

Four scientific communities (which became groups 30, 35, 40, and 45) began using EIES in the period between October, 1977 and February, 1978. All four agreed to take part in this study. Several other groups later joined the system and participated in either the full study or in use of some of the same survey questions.

Group 30, "Futures Research Methodology," is composed of persons who have conducted planning, forecasting and similar studies, and are attempting to discuss and improve methodology in this area. As pointed out in the proposal submitted for this operational trial, "Since futures research methodologists come from a wide variety of backgrounds and disciplines, the channels of communication which would ordinarily be provided by a single professional society do not exist (Martino,1977:2). It was hypothesized that use of EIES would significantly enhance the rate of innovation and dissemination of fruitful new ideas in the field. These conditions and hopes are similar to those stated in the proposals for groups 35, 40, and 45.

Group 35 is the "Social Networks Community," which is composed of sociologists, anthropologists, political scientists, and others who share an interest in the study of social networks, or the patterns and types of "ties" that connect members of groups or communities of various types. As they state in their self description, their "aim is to enhance individual productivity and to facilitate the development of group goals, standards and the like."

Group 40 is "General System Theory." As their principal investigator states, "General System theorists constitute one of the few research communities that are deliberately trying to integrate a wide variety of scientific disciplines. The group plans to use the test facility not only to conduct research, but also to educate each other in the various disciplines and approaches involved. As "common tasks," the participants will compile a glossary of terms and a 'disciplinary matrix' for the field" (Umpleby, 1977:1).

Group 45 consists of people who share an interest in the development of assistive and adaptive devices for the disabled, and includes disabled persons, research engineers, and consumer-oriented organizations.

Group 54 is the fifth group which fully participated in the study. "Mental Workload" joined EIES a year after the initial "operational trials" groups. They are concerned with complex man-machine systems, such as the cockpit of a jet plane or the control system in a nuclear power plant. One of their objectives was to publish an "electronic journal." They experienced many difficulties, including the fact that a large portion of their group was British, and the British PT&T (Post, Telephone and Telegraph) would not allow them to use EIES, even though funds had been provided by the British equivalent of NSF. (See Turoff and Hiltz, 1980, for an account of this and other "electronic journals" on EIES. All use of computer mediated communication systems on TELENET which might be used for cross-Atlantic message traffic were denied permission by the PTT, which has a monopoly on telecommunications.)

Also included in the follow-up study is a smaller group (50) which used the system for about three months. It consisted of about a dozen computer scientists and information analysts interested in the use of systems like EIES for information analysis tasks. An interesting aspect of Group 50 is that they "moved" to EIES from the PLANET conferencing system.

Partial data is available for Group 80, the Hepatitis Knowledge Base project of the National Library of Medicine. This group included approximately ten medicaal doctors who are experts on the disease. They used EIES to review and update a synthesis or "knowledge base" of research results related to the diagnosis and treatment of viral hepatitis.

In addition to the groups included in this study, many other groups used EIES and some included an evaluation effort which made use of questionnaire items borrowed from the instruments used on the above groups. The data for these groups is not included here, since they are not scientific communities, but may be encountered in other reports on the EIES system:

LEGITECH, a network of state legislative science advisors and resource persons (evaluated by Valarie Lamont).

JEDEC, a standards-setting group of the Electronic Industries Association (evaluated by Peter and Trudy Johnson-Lenz).

WHCLIS (White House Conference on Library and Information Services).

The national advisory group used EIES to work with the central staff in Washington to plan the conference (evaluated by Elaine Kerr).

The above groups permitted participant observation in their conferences and activities, and these qualitative observations have helped to form some of the conclusions and interpretations in this report.

"User group" is a complex variable which includes differences in the following attributes:

1) Nature of the task

2) Size and social organization of the on-line research community. This can influence the amount of information flow.

3) Leadership style (or in some cases, lack of any leadership for at least some periods).

4) Special software features which were built for some groups but not for others.

It was hypothesized that group membership would affect perceptions of the EIES system, and mediate some of the hypothesized impacts of its use.

Characteristics of the Subjects

Information from the pre-use questionnaire supplies us with a general picture of the scientists included in this study. For complete percentage destributions on the characteristics summarized below, see the questionnaire in the appendix.

In terms of employer, 80% of the subjects in this study worked in academic institutions, 10% were employed by private research organizations, and only a handful worked in business or government organizations. Geographically, the EIES users were spread throughout the United States, but the largest concentrations were in the Northeast, Middle Atlantic, (including Washington, D.C.) and the West. A few were located in Canada or Europe.

Almost all of the subjects were males. Most were between 25 and 44 years old and had a Ph.D. They tend to be "mid career," having received their degrees five to nineteen years previously. A third were in the midst of writing one or more books when they joined EIES, and the majority were working on one or more journal articles. Almost all had published one or more journal articles previously, and about a fifth had published thirty or more articles. Compared to the total population of scientists, then, most of whom have never published anything, the scientists using EIES were considerably more productive than average. They are hard working, with the majority reporting considerably more than the forty hours which most Americans think of as a "normal" working week. Much of their time is spent teaching, reading professional literature, doing research and writing, with meetings and administrative duties taking considerable time for some.

Although most were not previous users of a computerized communications system, they had used computers and computer terminals before, and had positive attitudes toward computers.

Terminal access was less than ideal. Only about a quarter had their own terminal in their own office. One in five reported no regular terminal access at all. The majority did not have a terminal which they could use at home.

CHAPTER TWO

DETERMINANTS OF USE OF THE EIES SYSTEM

One of the most intriguing aspects of computer-based communications systems is the contrast between users who integrate this new form of communication and information exchange into their lives and those who do not use it at all, even if they have free access. What explains or predicts acceptance of a system such as EIES?

In this chapter, we will look at which variables do or do not explain differences in amount of use of the EIES system. The other aspect of user acceptance, subjective opinions of the system, will be examined in a later chapter. By way of introduction and summary, it may be said that the various pieces of data all point to one overall conclusion: it is aspects of the subjective motivations of the participants, not the objective characteristics of the system, which are the primary determinants of amount of use, at least in terms of initial system acceptance. This is not to say that long-term users are not sensitive to the objective characteristics of the system or that system characteristics do not influence subjective statisfaction, the choice among available systems, or the range of professional activities for which a computer-mediated system will be used.

CONCEPTUAL FRAMEWORK

Expanding and building upon the original list of factors generated by Vallee et al. (1974:22) one can categorize the determinants of acceptance and use of computer-based communications systems as determined by characteristics of the INDIVIDUAL USER, the SOCIAL GROUP OR ORGANIZATIONAL CONTEXT, the TASK, the SYSTEM itself, and the EQUIPMENT which the individual and group have to use with the system.* These sets of factors may be treated as competing hypotheses or alternative explanations for predicting amount of use of the system.

The full frameworks for potentially predictive characteristics of the individual and of the social group or organization are shown in tables 2-1 and 2-2. Within the context of studying only five EIES groups (which did not have any particular task and which were confined to a single system, with little variability in available equipment), most of the attributes of Task, System and Equipment that have been developed could not be included in this study of determinants of system use.

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*This framework was expanded and developed in a workshop project funded by the Division of Information Science and Technology, NSF. Contributions were made by Murray Turoff, Valerie Lamont, Elliot Siegel and John Senders, as well as the author of this report, who is simultaneously P.I. for the workshop project.

In regard to the SYSTEM and EQUIPMENT, we have some data on the effects of the following:

DOCUMENTATION (was it clear and comprehensive, or not)

Whether or not there was a "live" teacher provided

Quality of the TELENET interface (whether or not TELENET was a source of "trouble")

Whether or not the system was a source of difficulties

System Availability (downtime during workday or unavailability nights and weekends)

Trouble with the telephone or high cost of long distance telephone due to absence of TELENET node

Access to terminal (own or share or none at office; own or available loan or none at home)

CRT, print, or both

Size and weight and printing speed of the terminal(s) available

We have two sources of independent variables in exploring the source of determinants of the amount of use of EIES. The first consists of data from the follow-up questionnaire in which the respondents themselves report what factors are important in limiting their use of EIES. Then we will turn to data on variables included in the pre-use questionnaire and examine correlations between initial attributes of the individuals and the amount of use which they make of the system. There are also a few other variables measured on the follow-up questionnaire which may help to explain variations in use, such as leadership behavior.

Correlation and significance statistics will be used to categorize observed relationships as strong, moderate, weak, or non-existent.*

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*When examining correlations, the most frequent measure will be gamma, which is appropriate for linearly related ordinal variables. Occasionally, the pattern of correlation is curvilinear, in which cases we will report ETA, a measure of curvilinear correlation.

Chi square tests are used for all cross tabulations to estimate the significance of the patterns of association. The results of the chi square tests should be interpreted as a very rough measure of the extent to which the number of observations and the patterns of association observed are large enough to serve as the basis for generalizable conclusions. Since the respondents do not represent a random sample of all users of EIES, let alone of all potential users of all such systems, chi square or t-test results cannot be interpreted rigorously in terms of a level of confidence in generalizing to such a larger population.

In looking at correlations of pre-use attitudes and characteristics with subsequent hours on line, we will refer to correlations of .10 to .20, accompanied by probability levels of .10 or less, as being "weak" relationships. If the correlation is less than .10 or the significance tests indicate that the probability that the results could be accounted for by sampling error is greater than .20, we will say that there is "no relationship". Moderate relationships refer to correlations between .20 and .49, with at least a .10 level for significance. "Strong" relationships will be said to exist for those that are characterized by correlation coefficients of .50 or greater, significant at the .05 level or better.

In looking at directly reported reasons explaining limited use of the system, we will call those named by 20% or more "strong"; 10-19% "moderate"; 5-9% "weak";and less than 5%, not a determinant.

TABLE 2-1

CHARACTERISTICS OF INDIVIDUALS WHICH MAY AFFECT SYSTEM ACCEPTANCE

* Indicates that one or more measures of this factor were included in this study

A. Attitudinal variables
1. Attitudes toward task
a) Relative importance or priority*
b) Degree of liking or disliking of the task (pleasant/unpleasant, challenging/boring, etc.)
2. Attitudes toward media
a) Attitudes towards computers in general*
b) Expectations about the specific system
1) Anticipated usefulness (amount of use)*
2) Anticipated impacts on productivity*
3) Anticipated difficulty of use
c) Attitudes toward alternative media (telephones, writing letters, travel, etc.)
3. Attitudes toward the group (liking, respect, whether they are an important reference group)
4. Expectations about how system use will affect relationships with the group*
5. Perceived pressure to use the system*

B. Work Related Skills and Characteristics
1. Personal communication skills
a) Reading speed*
b) Typing speed*
c) Preference for speaking or writing*
d) General literacy (writing ability)
2. Previous related experience
a) Experience using computers*
b) Use of computer terminals*
c) Use of other computer based communication systems*
3. Physical or intellectual disabilities
4. Productivity
a) Hours per week worked*
b) Number of publications or other output measures*
5. Connectivity
a) Number of persons in field with whom one is in contact*
b) Number of persons on system with whom one was in previous contact*
c) How well known person is in field*
d) Whether a scientist feels "in the mainstream" or not*
e) Number of coauthors (or coworkers)*

C. Demographic characteristics
1. Age*
2. Sex*
3. Educational level*
4. Race, nationality or subculture

D. Environmental variables
1. Available resources, including secretarial support

2. Position in the organization (or status in informal group)*

3. Amount of pressure to use the system (from superiors and peers)*

E. Psychological variables

1. Personality characteristics (e.g. introversion vs. extroversion, as measured by Myers Briggs type indicator)

2. Basic values (e.g. the pattern variables - universalism vs. particularism; affectivity vs. affective neutrality)*

TABLE 2-2

GROUP FACTORS WHICH MAY AFFECT SYSTEM USE

*Indicates that a measure of this factor was included in this study

A. STRUCTURE
1. Size*
2. Degree of geographic dispersion
3. Centralized vs. decentralized control
4. Pre-existing communications ties or network
B. LEADERSHIP
1. Style
2. Level of effort or activity by the leader
C. COHESIVENESS
1. Socio-metric ties
a) Have they met face to face?
b) How many members of the group are known to each other before they begin communicating on the system?*
c) Have they worked together previously?
D) do they form cliques, have many "individualists," or are they an integrated group?*
2. Competitiveness*
3. Trust or openness among members*
4. Status (are most group members prestigous in their fields, or not?)*

Measuring Level of EIES Use

An overall profile of the "average" (mean) use of EIES during the operational trials is shown in Table 2-3. This is derived from monitor data on the cumulative activity of all EIES members as of April 1, 1980. At that point in time, more than half of the members of the system were non-scientific users, and some of the members of the operational trials groups had been deleted and thus are not included in the computation of the average. The data do give us a rough idea of the usage patterns of members. For instance, we see that users did most of their sending in the form of private messages, which go to about two persons on the average; but most of their reading in the conferences, where items are read by about twelve persons, on the average. We also note a fairly long average session length (24 minutes).

However, usage is highly skewed. Table 2-4 shows the somewhat astounding fact that 40% of the scientists invited to have free access to EIES either never signed on at all, or dropped out before learning to use the system. Within this "dropout" category, 11% of the sample never signed on at all.

In a system such as EIES, when use is voluntary for most members (such as during the operational trials), amount of use in terms of hours on line can be taken as a fairly valid measure of user acceptance. However, lack of use in the totally "voluntary," almost "extra-curricular" mode that characterized the operational trials cannot be assumed to validly indicate rejection of the system. It simply indicates that the relative costs and benefits were more favorable for off-line activities. (In other words, low use has to be accompanied by poor opinions of the system in order to indicate active "rejection" of the system.)

Since use was skewed and our independent variables are mostly nominal or ordinal, cumulative hours on line has been divided into levels or categories for most analyses. This procedure has the advantage of not weighting the small number of users with very high numbers of hours of use too heavily in the analysis. It has much the same analytical effect as using the log of the number of hours, in those analyses where both methods of handling the dependent variable were tried and compared.

The first level consists of those who did not accept the system: never signed on at all, or did not stay on line long enough to get through the learning period and be able to use the system effectively (this is less than five hours total use, referred to as the "drop outs"). "Low" use level is 5 to 19 hours; "intermediate", 20 to 49 hours; "high" use 50 to 99 hours on line; and "very high" is more than one hundred hours of connect time. These break points correspond to observed changes in user behavior derived from monitor and questionnaire data, as well as giving us reasonable marginal distributions among the levels.

These data are available for cumulative hours on line at follow up, post use, and several other points in time. The follow-up data have been chosen as the focus for this analysis. One reason is that this is the point for which we have the most questionnaire data. Even the "dropouts" were sent a two page follow up, asking for a ranking of reasons for not using the system. Total responses to the short (for dropouts) and long follow up questionnaires were 195 out of 213 members of the groups in the study, almost twice as much questionnaire data as are available if the post-use questionnaire were used. Another reason is that "acceptance" or "rejection" can be fairly clearly established in the first three to six months. If a person does not use the system in that period of time, they are very unlikely to ever use it. In fact, many of the non-users were subsequently dropped from the system by the group leaders.

Table 2-4 indicates that usage patterns were correlated with group. Group 54 (Mental Workload) had the highest dropout rate (62%). Many of these were the British users who were refused access by the British Post Office. Group 45 (Devices) also had a large number of invited participants who never became active. The lowest dropout rates were among the two task-oriented groups (50,Information Science, and 80, Hepatitis). These also happened to be the smallest groups; thus, if there is any overall relationship between group size and amount of use of a system by its members, it cannot be determined from the operational trials groups. We will look at a few group-related variables which seem to predict amount of use of EIES in this chapter, related to the PERCEPTIONS of the members about the competitiveness or unethical behavior of the members and total self-perceived status level of the group's members. Other group factors which may explain these variations are further explored in Chapter Three.

TABLE 2-3

AVERAGE USER PROFILE

CATEGORY	AMOUNT
Hours Used	105.5
Number of Sessions	265
Average Session Time (minutes)	24
Text Items Composed	279
Text Items Received	1,194
Items Transacted/Session	5.6
Average Input Rate (words/minute)	7.9

SUBSYSTEM	% OF ITEMS COMPOSED	% OF ITEMS RECEIVED	SIZE (LINES)	CIRCULATION RATIO
Messages	69.1	35.8	10	2.2
Conferences	22.3	60.9	14	11.7
Notebooks	8.6	3.3	19	1.6

Source: Accumulated Monitor Statistics as of April 1 1980

TABLE 2-4

HOURS ON LINE AT FOLLOW UP, BY GROUP

Group	less than 5*	5-19	20-49	50+
30(N=35)	34%	20%	29%	17%
35(N=40)	32%	25%	28%	15%
40(N=51)	33%	33%	22%	12%
45(N=48)	58%	25%	13%	4%
50(N=8)	12%	62%	13%	12%
54(N=21)	62%	29%	5%	5%
80(N=10)	20%	50%	20%	10%
Total(N=213)	40%	29%	20%	11%

*Includes persons who never signed on

Source: Monitor statistics for cumulative time on line, June 1, 1978 or beginning of month when follow up was returned

SUBJECTIVE REPORTS OF FACTORS WHICH LIMIT USE OF EIES

Table 2-5 shows the overall ratings of the importance of various factors in limiting use of EIES, at follow up. These responses lump together the dropouts, the very heavy users and all those in between. A subsequent set of tables, at the end of this chapter, breaks down the responses by level of use. Surprisingly, there are not many differences by level: reasons given as very important by those who never used the system or used it very little are almost the same in terms of frequency of mentions as those given by heavier users. The main results of these cross tabulations can be discerned from the correlation coefficients reported in table 2-5, in conjunction with the results of the Chi square test which indicates the level of statistical significance of the observed correlation. A minus sign in front of the correlation coefficient means that the reason was given more frequently by dropouts and low level users than by high level users.

The reasons in table 2-5 have been listed in order of the frequency with which they were named as "very important" by all users, with some weight given to the frequency of "somewhat important" responses. We see that conflicting demands and priorities are by far the most important barriers to use. One reads the data in Table 2-5 as follows. Overall, 47% of users report that an important limitation on their use is that "other professional activities must take higher priority." The frequency with which this reason is indicated is somewhat higher for the dropouts and infrequent users, indicated by a Gamma of -.17. This weak relationship with hours on line is not statistically significant (p=.16). The full tables from which the gamma and p figures are drawn are in the appendix to this chapter.

Qualitative data from the post-use questionnaire reinforces the importance of the relative priority of the task in determining level of use of the system. Many respondents indicate in their open-ended comments that the work for which they are being paid conflicts with use of EIES. In fact, many see EIES as taking away from the time needed to do their official job. Communication with ones peers in other institutions is simply not as high a priority as the work commitments pressing in at the workplace. A selection of such comments, from the open-ended question on the post-use questionnaire, is shown in Table 2-6. (The full list appears in the Appendix).

A related motivational variable is having "no one on the system with whom one wishes to communicate a great deal". Though only 7% of all EIES respondents list this anti-social sounding reason as "very important", those who do feel this way are likely to be dropouts. Not a single user in the sample who did not particularly want to communicate with the limited community on line logged over 50 hours, and the correlation (gamma= -40) is the strongest for any of the self-reported reasons for non-use.

After the motivational variables of conflicting priorities and lack of desired communication partners, but far behind, are factors that have to do with access to the system. "Limited night or evening hours" was a strong enough deterrent so that steps were taken to put EIES up seven days a week, around the clock. During nights and weekends, someone is not always at the console in case of a crash, but a system was devised whereby EIES can be restarted remotely, by telephone, if it is found to have crashed.

Another access barrier ranking high on the list of factors which decrease use of EIES is trouble with the TELENET link. (The more time they spend on line, the more trouble they have. And TELENET's reliability has been decreasing, not increasing. See the discussion below). Closely behind this is the related access barrier of trouble with the telephone connection. But note that reporting of all of these access barriers INCREASES with use....in other words, encountering access difficulties does not cause low use, but is rather proportional to the amount of use.

The one frequently mentioned access barrier which does appear to be a cause of low use is inconvenient access to a terminal.

Characteristics of the system-- having bad experiences such as a crash, or the feeling that it is "too complicated"-- are "somewhat" important reasons cutting down use, but are not very important to many users. "Bad experiences" peaks in the low use range (5-19 hours), where 40% say this has been "somewhat" important in cutting down use.

The relatively low prominance given to cost is probably attributable to the subsidized memberships of the users. They generally had to pay only local telephone charges to reach a TELENET node. For non-subsidized users, cost would undoubtedly be a more important factor accounting for level of use.

Telenet Troubles

In the Appendix is a selection from the first fifty comments of the public conference on EIES established to air "TELENET Experiences." Begun at the end of the operational trials, it acquired 72 entries in the first month, most of which are descriptions of difficulties. The number of TELENET difficulties encountered during a month by all users is undoubtedly many times that which users take the time and trouble to document in the public conference.

The "norm" on EIES is that items in public conferences are indeed that: public statements and quotable without permission. This is not true of group or private conferences, for which the norm is that permission to quote or disseminate further should be requested. The selected items have been incorporated intact, complete with whatever typographical errors or differences in formatting appear in the original. Aside from the content, several things should be noted about this transcript as an example of a computerized conference:

1) Generally, the agenda and ground rules for discussion are proposed by the moderator, and discussed and agreed upon at the beginning of a conference.

2) The comments actually do refer to and build upon one another, constituting a genuine multilogue rather than a series of discreet monologues.

3) Pen names are frequently used as a device to play "devil's

advocate." Anonymity is also frequently used in this manner, and also to express feelings that the author may intend to represent those of other members, too.

The TELENET difficulties encountered included the following:

1) Local TELENET nodes become overloaded; they simply do not answer when dialed or they give a busy signal.

2) One or more local nodes goes out of service. If it is the Newark node, then no one can reach EIES through TELENET.

3) Users are dropped by TELENET and are "frozen" on line. More specifically, somewhere in the network, the fact that the user is connected to EIES gets lost. The packet loses its address, so to speak, and does not get delivered to the EIES computer. The user inputs and gets no response, because EIES receives nothing to respond to. Meanwhile, the port on EIES sits open, with EIES waiting for the lost packets that never arrive. If the user hangs up and redials, she or he discovers that "That ID is in use." EIES has received no signal that the user hung up the phone, and keeps the line open until either the automatic time out occurs (for which the default is set at twenty minutes) or a privileged EIES staff member "bumps" the frozen ID. Users find themselves, if they know someone else's access code, in the absurd position of signing on as someone else in order to request that their own ID be "bumped." Or they call Newark. Or they impatiently wait for twenty minutes. Or they give up and end the session.

4) Most seriously of all, TELENET sometimes mixes up packets and switches users, even among different computer systems. (See especially, cc33).

Along with what most users felt was a constant decline in the quality of TELENET services, the fall of 1980 brought a rise in price for TELENET: from 3.75 to $5.00 per hour-- a sufficiently large increase to constitute an economic problem for many users supporting their own account charges. As one user summed up the situation (Douglas Cayne, in c1011cc35),

> If the networks can do no better than offering this sort of consistently poor--borderline unusable--service, it may be many more years than we've been predicting before we become the Network Nation, or before people find computers useful enough to have in the home...

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Table 2-5

Importance of Various Reasons in Limiting Use of EIES, And Correlation (Gamma) with Level of Use

Reason	Very Important	Somewhat Important	Not Important	Gamma	p
Other professional activities must take higher priority	47%	30	22	-.17	.16
Limited night or evening hours	20%	21	60	.27	.05
Inconvenient access to a terminal	19%	18	63	-.15	.16
Trouble with Telenet	15%	19	65	.31	.01
Had some bad experiences	11%	31	58	.29	.005
The system is too complicated	9%	25	66	.12	.001
Trouble with telephone	10%	17	74	.20	.05
Cost of telephone or Telenet	9%	11	80	.08	.45
There is no one on this system with whom I wish to communicate a great deal	7%	16	77	-.40	.14
The conference comments or messages I have received do not seem worth reading	7%	31	62	-.01	.05
Red notebook documentation looked like too much to read	6%	27	68	-.13	.04
Inadequate leadership of the group	5%	17	78	.14	.59

Table 2-5, Con't

Reason	Very Important	Somewhat Important	Not Important	Gamma	p
I am not very interested in the subjects being discussed	6%	17	77	-.02	.60
I do not know how to type	5%	15	80	.08	.54
I do not like using a computer system like this	3%	8	89	.15	.76

Source: Follow-up questionnaires sent to Groups 30, 35, 40, 45, 40, 54, 80.

Total N responding is 195

Note: Gamma= correlation with accumulated hours on line at follow-up, categorized by level. A "minus" gamma indicates that the less time on line, the more likely the person was to name the reason as very important.

"p"= probability that the correlation could be attributed to sampling error, based on Chi square test.

TABLE 2-6

"What one or two factors best explain why you have not used EIES more?"

Post-Use Open Responses Emphasizing Priority Conflicts

1. I'm very busy, with heavy commitments. EIES doesn't contribute to any of the things I really MUST do. It is a peripheral interest."

2. Too busy with other things

3. Time pressures resulting from need to EARN by consulting and teaching extra loads

4. Lack of time- other research projects are more pressing

5. Lack of time and pressure of my business-- I am associated with a small R&D firm which implies a constant need to seek new contracts.

6. I am under a great deal of time pressure

7. I work full time and am a full time graduate student and half-time mother-- need I say more?

7. Other matters, with more immediate DEADLINES, kept interfering.

8. Very busy with other things such as classroom teaching; talking with students; working on articles and proposals; committee work.

9. External pressures for time keep me elsewhere. Except for a few direct research collaborations over EIES, the rest seems more like an interesting luxury than a necessity.

10. There is no job related reward. EIES takes time and is not recognized by the university...this is unfortunate.

11. Pressure of administrative responsibilities.

12. It is extremely difficult to match full-time (university) professional interest and responsibilities with those generated by the wide membership of EIES.

13. Extremely busy schedule during last year.

14. Lack of time to participate. THIS IS THE ONLY reason.

15. Work pressure

16. Other time consuming work is more pressing

The Relationship Between Amount of Use and Reasons for Non-Use

Looking at the set of cross-tabulations of reasons limiting use of EIES by actual hours of use made of the system (in the Appendix to this chapter), there are far fewer differences than might be expected. Higher priority for other (off-line) professional activities is particularly important for the drop-outs (named by 55%). The massive nature of the "red notebook" documentation shows up most frequently as "somewhat" important for the intermediate-level users. And the feeling that the system is too complicated becomes a deterrent at the higher use levels, more than the lower, somewhat surprisingly.

Reasons Given by Dropouts

A subgroup of particular interest is the "dropouts". The following are the only reasons listed as "very important" by 10% or more of dropouts:

Other professional activities	55%
Terminal access	19%
Limited night or weekend hours	12%
No one to communicate with	12%
Trouble with telephone	11%
Material not worth reading	10%

Looking only at the reason named as the single "most important," conflict in priorities with other professional activities is the only reason given with great frequency by the "dropouts" (those who never spent more than five hours on EIES). The second most frequently listed "most important factor" by the dropouts is inconvenient access to a terminal, named by 9%. (The complete table of these data is not included here. Almost all reasons, except the above two, are named as "most important" by only a small number of people).

PREDICTORS FROM THE PRE-USE QUESTIONNAIRE

Many of the questions in the pre-use questionnaire, measuring motivation to use the system before having any experience with it, turn out to be significantly correlated with subsequent amount of use. This includes anticipated value of the system (Table 2-7) and amount of time spent on the pre-use questionnaire (Table 2-8). The latter may seem to be a surprising predictor, but it is an interesting behavioral measure of pre-use attitude toward the system and the project. The strongest predictor is the amount of time which a prospective user estimates that s/he will spend on line each week (Table 2-9). Two thirds of those who felt that they would spend less than 30 minutes a week on line became dropouts.

On the other hand, most of the "objective" characteristics of users that might be thought to predict acceptance, such as typing speed, did not turn out to be related to amount of use.

Estimated number of sign-ons per week, before the system was used, follows the same pattern as anticipated time on line per week. A third (28 of 89 responding) estimated that they would sign on only once a week or less. Twenty-three of these users in fact were drop outs or low level users (gamma= .50, p= .02).

ANTICIPATED WORTH OF SYSTEM BEFORE USE, BY TOTAL TIME ON LINE, AT FOLLOW UP

Total Hours	Use-Less	Others	Skep-tical	Neu-tral	Lim-ited	Use-ful	Revolu-tionary	De-pends
<5	50%	100%	25%	100%	36%	25%	0%	60%
5-19	0%	0%	50%	0%	25%	35%	0%	20%
20-49	50%	0%	25%	0%	36%	22%	33%	20%
50-99	0%	0%	0%	0%	3%	13%	17%	0%
100+	0%	0%	0%	0%	0%	5%	50%	0%
Total	100%	100%	100%	100%	100%	100%	100%	100%
N	2	1	8	2	28	40	6	5

Chi square = 44.7545 p = .02 gamma = .27

Question:

Which of the following BEST describes your anticipation of the system's worth?

--I think it will be useless
--I think it is useful for others, but not for me
--I am skeptical about it but willing to try it
--I am basically indifferent or neutral
--I think it will have some (limited) worth worth for me
--I think it will be useful in many respects
--I think it will revolutionize my work/communication processes

TABLE 2-8

TIME SPENT TO COMPLETE THE PRE-USE QUESTIONNAIRE, BY TOTAL TIME ON LINE, AT FOLLOW UP

Total Hours	1-10 minutes	11-20 minutes	21-30 minutes	more than 30 minutes
Less than 5	47%	33%	11%	35%
5-19	30%	38%	37%	15%
20-49	14%	21%	32%	35%
50-99	6%	8%	10%	9%
100+	3%	0%	10%	6%
N Responding	136	24	19	34

Source: Pre-use Questionnaire Question: How long did it take you to complete this questionnaire?

Chi square= 22.15, p=.03, gamma= .30

TABLE 2-9

ANTICIPATED WEEKLY USAGE OF EIES, BEFORE USE, BY TIME ON LINE AT FOLLOW-UP

	< than 30 min.	30-60min.	1-3 hours	4 hours
< than 5 hours	62%	35%	40%	4%
5-19 hours	25%	50%	20%	20%
20-49 hours	13%	15%	29%	44%
50+ hours	0%	0%	11%	32%
N	8	20	35	25
	100%	100%	100%	100%

Chi square = 50.7 p = .001 gamma = .54

Source: Pre-Use Questionnaire
Question: How much time in the average week do you foresee yourself using EIES?

Connectivity

There is a weak to moderate relationship for various measures of general connectivity to other professionals. For off-line relationships, specifically number of coauthors in the previous year and total number of persons in the specialty with whom the member is in contact, the relationships seem somewhat curvilinear. That is, the isolates and the socio-metric stars do not use the system as much as those with moderate numbers of professional connections, who seem to have the most motivation to expand their professional networks.

In terms of previous contacts with members of the actual on-line group, the relationship becomes very strong. The question asked at pre-use was how many persons among those in the specialty with whom the scientist had contacts were in the proposed EIES group. Previously knowing a large number of the on-line group members is the strongest predictor of very high levels of subsequent use of the system. A series of step-wise multiple regressions was conducted to find the strongest combinations of predictors of amount of use of EIES (see the end of the chapter). When the total number of hours on line at follow up was used as the dependent variable (rather than the log of the number of hours, or the level of use, in categores), the strongest predictor is this variable (Pearson's R = .48).

The Effects of Perceived Competition

Contrary to the hypothesis that the higher the perceived level of overall competition in the specialty, the lower the amount of use of EIES, there is no significant relationship. With the degree of overall competition categorized as intense, moderate or weak to non-existent, the correlation (gamma) was only .13 and it was statistically insignificant (p = .72). There is a stronger relationship at the GROUP level (see chapter 3).

However, there are relationships between perceptions of specific KINDS of competition and amount of use of EIES. Those who perceive comptition over funds are slightly more likely to drop out (33% vs. 26%) and less likely to become heavy users in the first three to six months (9% of those reporting competition related to insufficient funds logged fifty or more hours, vs. 18% of those who did not perceive competition of this sort. Overall gamma=.19, p= .13).

Only seven persons who reported competition related to unethical practices among some scientists in the field also completed the follow-up questionnaire. This makes it unlikely that any statistically significant relationships can occur related to reported presence of unethical behavior (which is interpreted as a measure of trust in the group) However, as we see in Table 2-10, there does appear to be a relationship. Given the strong relationship but the low number of subjects, we will call this relationship "strong," even though it does not meet the statistical significance guidelines.

On the other hand, there is an apparent tendency for those who feel that competition in their specialty consists of arguments among those with strongly opposing views to spend more time on EIES. Only 19% of those reporting this reason for competition dropped out, vs. 35% of those who did not. At the other end of the scale, 24% of those reporting opposing viewpoints became heavy users, vs. 10% of those who did not. However, once again we are working with small numbers (21 reporting this form of competition), and even though there is a moderate correlation (gamma= .36), it is not statistically significant (p= .40).

There were no significant relationships with any of the other reasons for competition included in the checklist.

TABLE 2-10

PERCEIVED UNETHICAL COMPETITIVE BEHAVIOR VS. SUBSEQUENT USE OF EIES

Hours Used	Yes	No
<5	71%	26%
5-19	14%	30%
20-49	14%	29%
50+	0	15%
Number	7	66

Chi square= 6.5, p=.16

gamma=.68

Question: How would you rate the degree or intensity of competition within your research specialty? ... What are the reasons for this competition (check all that apply).

Scarcity of or competition for funds

Rival groups of collaborators

High achievement or success drive of persons in the field

Some persons act unethically

Strongly opposing views

Other

TABLE 2-11

WEAK OR INSIGNIFICANT CORRELATIONS WITH HOURS OF USE

Question	Gamma	Eta	p
Hours/week in specialty	.03		.47
Number of co-authors in last year		.27	.20
Extent to which scientist considers self in "mainstream"	.12		.11
Total # of contacts in specialty		.31	.23
Frequency of anticipation	-.13		.80
Concern about anticipation	.06		.34
Extent to which emotional commitment governs own behavior	.19		.53
Extent to which emotional commitment ought to govern behavior	.24		.14
Extent to which irrelevancy of personal attributes governs own behavior		.17	.04
Extent to which irrelevancy of personal attributes ought to govern behavior		.20	.02
Sex			.33
Education	.09		.98
Years since highest degree		.22	.29
Books currently in progress		.26	.10
Total articles published during career		.19	.71
Papers presented last year	.16		.06
Total productivity scale	.19		.52
Preference for working in established areas	.17		.49
How well known in field		.21	.62
Whether EIES will affect familiarity with one's work	.31		.68

Reading speed	.12	.86
Typing speed	.17	.31
Preference for writing vs. speaking		.71
Computers are (wonderful/terrible)	.07	.91
Previous use of message system	.11	.13
Previous use of terminals to play games	.14	.45
Access to terminal		.39
Trust computers	.06	.93
Perceived pressure to use the system	.28	.14
Anticipated usefulness of group conferences	.16	.08
Anticipated usefulness of text editing	.20	.01

Source: Pre-Use questionnaire (See appendix for wording)
Notes: Gamma notes linear relationship
Eta denotes curvilinear relationship
"p" is significance level, determined by Chi square test

Compliance pressure

At pre-use, users were asked to indicate whether they were "required" to use the system (only three checked this response), had been requested to do so (a form of pressure), or were free to use it as little or as much as they chose. Pressure to use a system like this seems to have the reverse effect. Among those who felt that they had been requested to use the system, there were more dropouts than among those who perceived free choice, and there were no heavy users in this "non-free choice" group.

Failed Predictors of Use

A number of other variables were hypothesized to affect amount of use of a computerized conferencing system. The hypotheses were tested by including indicators of these variables in the pre-use questionnaire, and cross-tabulating them by number of hours on line at the time of the follow up questionnaire. The following variables are not significantly related to time on line (as measured by division into the categories, less than five hours, 5-19 hours, 20-49, 50-99, and 100+):

1. Hours per week spent working on the specialty, or any other reported use of time gathered in the pre-use questionnaire.

2. Frequency of previous anticipation or concern about future anticipation of one's work by others who publish similar things first.

3. Age (There are too few users under thirty or over 50 to adequately test this relationship.)

4. Productivity in terms of reported books, articles, etc., either in the previous year or in one's total career. Although correlations with productivity measures are not statistically significant, there are some moderate correlations. They tend to suggest a curvilinear pattern more than a linear one. That is, those with moderate publication levels before use of EIES tend to use the system more. This makes some sense; those already publishing very heavily probably

do not need any new information resources or professional contacts.

5. Preference for working in established areas of science.

6. Subjective report of how well known the member is in his/her specialty. This is contrary to the hypothesis that those who are "low" in the status hierarchy will be more strongly motivated to use the system. However, as will be discussed below, a group aggregation of this variable does have some predictive power-- A scientific group seems to need a certain number of "stars" to motivate all of its participants.

7. Whether they thought that use of EIES would affect how well known they are in their research specialty

8. Reading speed

9. Speaking vs. writing skill. The question here was whether the prospective user thought that he or she was more effective when writing or speaking. Almost exactly the same proportions of the two types (speakers vs. writers, as self-assessed before system use) became dropouts or heavy users.

10. Typing speed

11. Attitudes towards computers (either on a "wonderful to terrible" scale, or in terms of trusting them to hold the daily working files that one needs).

12. Previous use of computers or terminals. Neither any of the individual items, nor a combined index on total previous use of terminals was a significant predictor.

The correlations and significance levels for these and other "failed predictors" are shown in Table 2-11. There is a suggestion that those who placed a high value on the unique features of EIES as compared to a message system (group conferences and text editing features) are likely to use the system more. This is similar to the finding that expectations about the system's overall usefulness helped to predict hours on line.

There is weak support for a relationship between basic values and subsequent use. The pre-use questionnaire contained sets of questions on two of the "pattern variables" used by Talcott Parsons and many subsequent sociologists to characterize value patterns. These are "universalism" vs. "particularism" (whether a scientist or his/her work is judged solely on the basis of their work, or solely on the basis of who they are, in terms of personal knowledge of or relationships with the person) and "affectivity-affective neutrality" (whether a scientist is emotionally committed to his/her theories, or totally objective and not emotionally involved with his/her scientific theories.)

There are weak relationships showing some tendency for those placing their answers at the "emotional commitment" end of the scales to use EIES more; and for those in the "balanced" area of the choice between the relevancy and irrelevancy of personal attributes for judging scientific work to use it more than those at either extreme. These results are suggestive of possible relationships, but not strong or consistent enough to say that we have proven that such a relationship does exist.

Collective Group Status

Although there is no relationship between the self-assessed status of the individual (unknown to top of field), there does seem to be a relationship with the collective status of the group. As shown below, the groups that had the largest proportion of well known members tended on the average to have the heaviest users of the system. What matters to the individual is how many OTHER GROUP MEMBERS available to communicate with have relatively high professional status.

Group	% Hi S	rank	% Hi Use	rank
30	42%	1	46%	1
40	24%	2	34%	3
45	23%	3	17%	4
35	22%	4	43%	2
54	14%	5	10%	5

Note: "HiS" stands for the proportion of group members ranking themselves as 6 or 7 on the seven-point professional status scale.

"Hi use" is the proportion of group members using 50 or more hours of line time by the follow up questionnaire.

Pre- Use Terminal Access

Although terminal access was reported as an important barrier to use by about 20% of subjects, there was no overall statistically significant association between the terminal access situation reported at pre-use and amount of time spent on line by the first follow-up. Many participants were given use of a portable EIES terminal; these were all persons who had reported no access to a computer terminal unless one were provided for them. This meant that they had a light-weight, 30 cps printing terminal available both for office and for home use.

What we find are some puzzling negative relationsips with terminal access and characteristics. For example we find the following:

Home access	% dropouts
Report terminal at home	40%
Report terminal available to take home	32%
No terminal available for home	28%

There was likewise no relationship with printing speed of the terminal, though one would be expected. Another puzzling relationsip is that the highest proportion of dropouts occurred among those reporting access to both a CRT and a hard copy terminal, rather than only one. This seems an ideal terminal arrangement for use of EIES. One possible explanation is that those in a terminal-rich environment are also in an already computer-resources rich environment, and do not need additional resources such as EIES.

It is certainly not likely that having a terminal at home or two terminals in the office caused less use of the system, but rather that motivational factors are simply much more important for the scientists in this study. For example, one member apologized for not using the system more because he had to drive about an hour each way to use a terminal--- and he was logging over ten hours a month! We have a curious disjunction between the lack of relationship between the terminal access situation at pre-use not being related to level of use of the system, and a fairly important role for subjectively reported terminal access barriers at follow-up. What probably happened is that strongly motivated users with poor access expended the time or money to improve their terminal access situation. But good terminal access alone, without motivation, will not lead to use of the system. In other words, there is an interaction between terminal access and motivational factors. Thus, the overall conclusion reached about the importance of terminal access to system use, given the findings on the followup questionnaire as well as the above observations, is that the relationship is conditional on motivational factors. If motivation is weak, poor access becomes a barrier that may be decisive in limiting use of the system; on the other hand, if there is no access at all, even high motivation cannot lead to high system use.

TABLE 2-12

Whether Individual Teacher or Written Material only Were Used in Learning EIES, by Accumulated Time on Line at Follow Up

Hours Used	Live Teacher	Written Only
<20 hours	56%	44%
20-49	31	34
50-99	6	14
100+	6	8
Total	100%	100%
N responding	32	77

Source: Follow-up questionnaire and monitor data

Chi Square= 22.4, p=.03

Question: Did someone demonstrate EIES to you in person, or did you learn from the written materials?

Live teacher

Written material only

The Effectiveness of a Human Teacher

It was hypothesized that those who had some personal training from another person would be more likely to learn the system and become regular users. There are many reasons for this. One is that personal training should be more enjoyable. The second is that it can be tailored to the questions and difficulties of the individual. There is every reason to believe that the personal teacher should be superior to simply receiving a large, standard document in the mail and teaching oneself.

However, the data in Table 2-12 do not support this. In fact, there is a statistically significant difference in the other direction--those who had only "How to Use EIES" and the use of on-line user consultants were less likely to become dropouts or low users than those who had some personal instruction.

We do not accept this as cause and effect. For one thing, there are no data about the extent and quality of the personal training that was received. Secondly, it may be that those users who were the most confused and negative were the most likely to seek a personal training session, and that without such personal attention from an experienced user, they would have been even more likely not to accept EIES.

Personal training is expensive and time consuming. The evidence from this study does not justify such expenditures. However, a controlled experiment with random assignment of subjects to different kinds of teaching materials (live teacher, written documentation, on-line lessons of an interactive nature) would be necessary in order to establish the relative effectiveness of these training methods for different types of users. The on-line lesson may well be the most effective method of all, judging from the many spontaneous requests received from users for this sort of aid, and from the fact that in controlled experiments, first-time users were able to learn to enter and receive material from EIES in about 20 minutes, with an interactive lesson on line.

COMPARATIVE RESULTS FOR A STUDY OF NLS

Gwen Edwards reports extensive data on the correlates of amount of use of NLS, a computer-based text processing and communications system. We will examine the results in some detail because it is the only other publicly available study which examines a wide range of variables in relation to acceptance of a computer-based communication system.

NLS is a general office support system. Particularly when used in conjunction with an intelligent terminal with a special "mouse" device for pointing during editing, it is excellent for document production. It also includes three communications capabilities: to exchange messages asynchronously, in real time, or to exchange files. It does not include a conferencing component or other structures meant to maximize group communication and exchange.

Edwards' (1977) study was based on a questionnaire sent to 250 users of NLS in thirteen organizations. Ninety four, or 38%, responded.

Of these, 30% were managers, 42% researchers, and 28% support staff. Some of the researchers also had a supervisory role, as a total of 40% reported some supervisory responsibility.

The NLS setting was quite different from the function for which EIES was used during the operational trials. It was used as a tool to directly support the regular, paid job. It is therefore most important in increasing the generalizability of the EIES findings that many of Edwards' findings about the importance of attitudinal variables are similar. A copy of Edwards' questionnaire was made available during the design phase of this study. Many of the items were borrowed to increase the direct comparability of the findings of the two studies. For example, the scale of useless/revolutionary was Edwards'. Though results for attitudinal variables measured with the same question are similar, there are some contradictory findings for other variables. The explanation may be that the specific questions used were quite different; or, the differences may be attributable to use by an office staff to support their work on the job vs. use by academics to support their informal, organizationally external communication. Still a third source of possible differences in findings are differences between the systems. NLS was a fairly complex, command driven system for augmentation of the individual "knowledge worker," which included some communications components. EIES is primarily a communications system with some text editing, and with a simple menu-driven interface for beginners who have no desire to master the full power available on the system.

Edwards' report frequently gives results for parts of the sample, as well as the whole sample. Results are reported for both total or "general" use, and for just communications use. Sometimes results are reported separately for supervisory and non-supervisory personnel, since this was found to be an important variable affecting use and attitudes. In looking at correlates of usage, the dependent variable "GENERAL USAGE" was broken into three ordinally ranked classes: "Low" usage of less than one hour a day (28%); "Medium" usage of one to three hours a day (31%), and "high" usage of three or more hours per day (41%). Note that the "middle" level usage of NLS for this study would constitute "high" usage on EIES.

Since Edwards' study was a single cross section, it is difficult to identify cause and effect. For example, when she reports that perceptions of increased productivity are associated with more use, we do not know if there was an expectation of increased productivity before use, the growth of this perception as a result of use, or a combination of both. Some of Edwards' findings are omitted from this summary because they seemed to deal more with perceived impacts as a result of use than with attitudinal causes of use.

Edwards reports that general attitudinal and access variables are most highly related to amount of use of NLS. The strongest correlation (gamma= .69) overall was between use of a terminal at home and amount of use. Typing skill was found to be related to use of NLS only among those who had a negative perception of the system (gamma =.68). Among those with medium to highly positive perceptions of the system, there was no relationship between typing skill and amount of use (gamma= .05). Edwards states that "Once the perceptual barrier is crossed, typing skill is irrelevant to usage." She also suggests that "we can recommend that when implementing an Office of the Future system, it will be beneficial to convince potential users that they need not know how to type to make effective use of the system" (p. 43).

The other variables which are most strongly related to total use are those which indicate perceptions of utility of NLS:

1. "Professional image": There is a gamma of .50 between the perception that use of NLS will improve one's professional image and amount of use. This is a variable which was not found to be a predictor for the scientists on EIES. A possible explanation is that the opinion of one's organizational peers is much more important to one's future career than the opinions of scientific peers on other academic campuses, who, after all, do not sit on one's tenure or promotion decision-making group.

2. Perceived impact on productivity: gamma = .49. This is measured with an identical question in the EIES study. The correlations are similar in direction but stronger for NLS.

3. It is related positively to the perception that NLS use increases the accessibility and visibility of one's work to others (gamma= .44)

4. There is a moderate relationship with the user's initial perception of the system and subsequent general use (.35). There is also a moderate relations with training, and sophistication of the terminal.

Generally, correlations with communications use are similar to but weaker than those with general or total use. However, one interesting exception is sharing a terminal. It does not affect general use, but having a shared terminal does impact on communications use negatively. Another difference is privacy: concern over it influences communications use much more than general use.

The correlations for training and terminal sophistication probably can be explained by the greater complexity of the NLS system for beginners. At the time of the study, it was command- driven, and designed to be used on a sophisticated terminal rather than a simple one. It is not likely that a beginner could learn NLS with no training or personal contact whatsoever with an experienced user. On the other hand, EIES was designed for use on a simple terminal, and to be usable by a beginner in a menu: driven mode without any formal training or personal instruction. In other words, the differences for these variables may be attributable to system differences.

Table 2-13
VARIABLES USED IN EDWARDS' NLS STUDY

ACCESS- user indicates that there was or was not difficulty accessing the system

ACCESSIBILITY OF WORK- on a five-point Likert scale, the degree to which the accessibility of the user's work to others is perceived to have increased or decreased

COMMUNICATIONS USAGE- frequency of use of the system for communications purposes (exchange of messages, documents, linking in real time)

DIRECT/INDIRECT USAGE- direct interaction on the terminal vs. using the system via support staff

GENERAL USAGE- Total hours per week

GROUP INCENTIVE- use is required, requested, or the user feels free to use the system as he or she chooses

HOME USAGE- individual does or does not occasionally use a terminal from home

IMAGE- on a five-point scale, the degree to which the user believes his or her professional image has been increased or decreased

INITIAL PERCEPTION- the user's retrospective reaction to the system when it was first introduced (thought it would be useless, thought it would revolutionize work/communication processes)

INVOLVEMENT- the user was or was not involved in the decision to subscribe to NLS

PERCEPTION- an index constructed from questions on current perception of the usefulness of NLS (same as initial perception scale, above); and five-point attitude scales on compatibility-incompatibility of the system to normal working/writing/thinking organizing style; flexibility vs. inflexibility of the system; reliability-unreliability of the system

POSITION- support staff, research, management

PRIVACY- individual doesn't use the system for work of a confidential nature; takes precautions to ensure the confidentiality of work, such as changing password; or does not let the privacy aspect affect use

PRODUCTIVITY- A five-point scale, the degree to which a user believed his or her work efficiency/productivity decreased or increased as a result of using the system

PROFESSIONAL IMAGE- believe that the system increased or decreased professional image

PROXIMITY- the distance between the closest available terminal and the user's office, defined as in the office, within 50 feet, or more than fifty feet from the user's place of work

QUALITY- A five-point scale, the degree to which a user believes the quality of his or her work has increased or decreased as a result of using the system

SHARING- the individual has sole or shared use of the terminal

SUPERVISION- the user does or does not supervise other employees

TELECONFERENCE- the user has or has not ever participated in a teleconference

TERMINAL TYPE- teletype only, CRT with teletype version; display based version of NLS with special terminal and electronic cursor

TRAINING- formal program, trained by other employee in charge of training; by other users of NLS; or no training program

TYPING SKILL- the individual does or does not claim to know how to type

Table 2-14

Correlations (gamma) with General Use and Communications Use of NLS

Variable	Genusage	Comusage
POSITION	-.10	.08
SUPERVISION	-.21	-.30
INVOLVEMENT	-.37	-.22
GROUP INCENTIVE	-.05	.09
TRAINING	.31	.23
TYPING	-.38	.22
TELECONFERENCES	-.22	-.50
TERMINAL PROXIMITY	.05	-.23
TERMINAL TYPE	.41	.48
SHARING	-.14	-.40
DIRECT-INDIRECT USAGE	.18	-.01
ACCESS PROBLEMS	-.18	-.01
PRIVACY	-.23	-.43
INITIAL PERCEPTION	.35	.27
PERCEPTION INDEX	.38	.24
PROGESSIONAL IMAGE	.50	.49
ACCESSIBILITY	.44	.35
PRODUCTIVITY	.49	.38
QUALITY	.38	.12
HOME USAGE	-.69	-.52

Source: Edwards, An Analysis of Useage and Related Perceptions of NLS, p. 43

TABLE 2-15

SUMMARY OF FINDINGS FOR EIES AND NLS

INDIVIDUAL CHARACTERISTICS

Variable	EIES	NLS
A. Attitudinal variables		
Attitudes toward task		
a) relative importance or priority	strong	
Attitudes toward media		
a) attitudes towards computers in general	none	
b) expectations about the specific system		
1) Anticipated amount of use	strong	
2) anticipated impacts on productivity	moderate	moderate
Expectations about how system use will affect relationships with the group	weak	moderate
Perceived pressure to use the system	weak (negative)	none
B. Work Related Skills and Characteristics		
1. Personal communication skills		
a) reading speed	none	
b) typing speed	none	conditional
c) preference for speaking or writing	none	
2. Previous related experience		
a) experience using computers	none	
b) use of computer terminals	none	
c) use of other computer based communication systems	none	moderate
3. Productivity		
a) Hours per week worked	none	
b) Number of publications or other output measures	weak	
C. Connectivity		
Number of persons in field with whom one is in contact	weak	
Number of persons on system with whom one was in previous contact	moderate-strong	
"No one" to communicate with	moderate	
How well known person is in field	weak	
Whether a scientist feels "in the mainstream" or not	weak	
Number of coauthors (or coworkers)	weak (curvilinear)	
D. Demographic characteristics		
Age	none	

Sex	none	
Educational level	none	
E. Environmental variables		
Position in the organization (or status in informal group)	none	
Amount of pressure to use the system (from superiors and peers)	weak-negative	none
F. Basic values (e.g. the pattern variabless: universalism vs. particularism, affectivity vs. affective neutrality)	weak	

SYSTEM CHARACTERISTICS

VARIABLE	EIES	NLS
In-person or formal training, vs. documentation only	none	moderate
Quality of the Telenet interface	moderate	
Whether or not the system was a source of difficulties	moderate	none
System availability (downtime during workday or unavailability nights and weekends)	moderate	
Trouble with the telephone or high cost of long distance telephone due to absence of Telenet node	moderate	
1. Access to terminal (subjective)	moderate	
2. Pre-use access to terminals		
a. Own or share at office	none	moderate
b. Terminal for use at home	none	strong
c. CRT, print, or both	none	moderate
d. Size and weight and printing speed of the terminal(s) available	none	

GROUP CHARACTERISTICS

STRUCTURE		
Size	none	
COHESIVENESS		
Competitiveness	none to weak	
Trust or openness among members	strong	
Status (are most group members prestigious in their fields, or not?)	moderate	

SUMMARY AND CONCLUSIONS

The results for variables observed in this study and the NLS study are summarized in Table 2-15.

Motivational variables are most strongly associated with level of use of the EIES system, rather than characteristics of the system itself. The most important reason given by users to explain limited use of EIES is that other, off-line professional activities must take higher priority. The relative priority of EIES-related and other professional work was by far the most important reason given both in the checklist on the follow-up questionnaire and in the post-use open-ended question.

The strongest observed correlate of the level of use is the ANTICIPATED level of use before experiencing the system at all. This variable is a conglomerate of individual attitudes and expectations, probably including relative importance to the person of communicating with others in the EIES group and amount of time available for such activities after the more mandatory job-related tasks are completed.

Measures of connectivity (pre-existing communication ties with other group participants) also appear important. An item on the pre-use questionnaire (number of group members previously known) yielded the highest Pearson's correlation coefficient with total hours of use at follow-up. An item on the followup self-reporting checklist ("There is no one on this system with whom I wish to communicate a great deal") yielded the highest correlation coefficient with level of use of any of the self-reported reasons.

Access barriers as a class (including access to a terminal, trouble with Telenet and system unavailability) are the second ranking type of factor related to amount of use of EIES. However, it must be noted that with the exception of terminal access, the perception of other access barriers is more an effect of moderate to high use than a cause of drop-out or low use behavior: the higher the level of use, the more frequently these barriers were indicated to be "very important".

Among the variables which were hypothesized to be positively related to level of use, but which are not significantly related, are receipt of personal training, reading and typing speed, attitudes toward computers, previous experience with computer terminals or message systems, and how well known the person was in the specialty. On the other hand, groups that were composed of a high proportion of high-status members were, on the average, more active than groups which had a small proportion of well known members.

In comparing the findings to a similar study of determinants of amount of use of NLS, we found that attitudes and perceptions were important predictors for both systems and types of users, and that typing skills are not a prerequisite for high levels of use. Terminal access and special training were more important for NLS. On the other hand, access barriers such as telephone or packet switching network (Telenet) problems and system unavailability nights and weekends during the first year were moderately important barriers to use of EIES, but not included in the NLS study.

The importance of pre-use motivational and perceptual factors suggests that there may be some important underlying psychological traits that may predict acceptance of systems such as EIES. An indirect indicator of this is the finding that scientists at the middle levels of productivity and connectivity within the specialty tend to use the system more. This may reflect achievement orientation or striving on their part to improve their professional standing. This observation has led to plans to put some basic psychological tests on line on EIES in the future, administer them to new users, and see to what extent they predict use of the system during the first three to six months.

Multi-Variate Analysis: Stepwise Multiple Regression

Multiple regression is a general statistical technique that can allow us to analyze the relative importance of the various strong predictors that we have identified, and to describe their interactions.

A stepwise multiple regression was chosen as the best technique for examining interactions among the identified causal factors. A forward stepwise inclusion technique was employed. The order of inclusion is determined by the respective contribution of each variable to explained variance in the dependent variable. The first variable entered is the one that singly explains the greatest amount of variance; the variable that explains the greatest amount of variance in conjunction with the first is entered second, and so forth, until no improvements can be made in the prediction. Another way to describe what happens is that the variable chosen at each step is the one which explains the greatest amount of variance which is still unexplained by the variables already entered into the equation at previous steps.

The independent variables chosen for inclusion are defined at the top of table 2-16. Two separate analyses are presented: the first for prediction of LEVEL of use (with 50+ hours as the top category); and the second for absolute number of hours of use. The latter analysis will favor variables which help to explain those with very high hours of use. A third analysis used the log of the number of hours; its results were very similar to that for level of use.

The advantage of this technique is that it allows us to compare the strength of the preuse predictors with that of the self-reported reasons, and to examine interactions among factors that may themselves be highly interrelated. The disadvantage is that the number of cases is greatly reduced; only those who answered all questions on the pre-use and follow-up questionnaires are available for inclusion in the analysis. This reduces our data base to only 65 cases.

We can see from the correlation matrix in Table 2-16 that the best overall predictor of level of use is the estimated number of hours of use per week, made before using the system. In turn, the highest correlate with this estimate is the number of other group members who were already known, before signing on. This gives us some insight into one of the probable strong determinants of this initial estimate-- the expectation that the system could be used to increase communication with colleagues with whom one had valued ties.

One of the characteristics of the stepwise procedure is that two highly correlated predictors are probably explaining "the same" variance; therefore, if one is chosen at step one, it is not likely that the second can make a great deal more contribution.

We also note that although "other professional activities" is the most frequently offered explanation for limited use of EIES, it in fact has little relationship to level of use.

Turning to the results of the regression, we can look at the order of factors, the extent to which the inclusion of each increases the multiple regression coefficient (MULT R) and its square (R SQUARE), which is the proportion of total variance in level of use that has been explained by the variables included in the equation at each step. BETA is the standardized regression coefficient.

After initial estimates of use, the variable which accounts for the most variance in level of use is the "NO ONE" to communicate with factor. One might expect this to be highly (negatively) related to the number of persons known before use; the fact that it is not suggests that there was a divergence for many between the expectation of who would be available on line, and who actually was there to communicate with. This of course fits in well with the observed high "drop out" rate. In other words, the prospective user knew who was expected to be available on line and used this to estimate amount of use of the system; however many of the anticipated communication partners were among the "drop outs," leaving many group members with the feeling that there was "no one" left with whom they wished to communicate.

This second predictor (NO ONE) raises the proportion of variance explained from 21% to 26%. None of the other variables make much of an improvement in our ability to predict. For instance, though perceived problems with terminal access is selected as the best predictor to be added on the third step, it only increases explained variance by 1%.

For analysis of absolute number of hours of use, rather than level of use, the number of group members known before the beginning of the computerized conferencing activity is the best predictor. It explains 23% of the variance. We can deduce from the difference between this and the previous analysis that those who knew many other group members before using EIES are likely to use a very high number of hours on line, communicating with all of these colleagues. Subsequent steps of the analysis are very similar to those for level of use: estimated hours improves the prediction significantly, followed by small improvements added by the terminal access and "no one" variables, and the subjectively reported "other activities" makes no objective difference at all. Altogether, the four variables entered into the equation yield a multiple correlation coefficient of .62, corresponding to 38% of the observed total variance in hours on line. There is thus still considerable "unexplained" variance in hours of use, not accounted for by the variables included in this study.

Table 2-16

Stepwise Multiple Regression

Determinants of Level of Use

VARIABLES

LEVEL= Number of hours on line at follow up, categorized as <5, 5-19, 20-49, 50+ (X= 2.4, SD= 1.0)

ESTUSE= Estimated number of hours per week that the system will be used, at pre-use; categorized in six levels (X= 2.26, SD= .91)

NO ONE= Level of agreement with statement at follow up that "There is no one on this system with whom I wish to communicate a great deal" (X= 2.7, SD= .6)

TERM= Level of agreement at follow up that inconvenient access to terminal decreases use (X= 2.3, SD= .9)

KNOWN= Pre-use response, "How many members of your EIES group do you know either professionally or personally?" (X=14.9, S.D.=18.4)

OTHACT= Level of agreement at follow up on importance of "Other professional activities must take higher priority" (X= 1.7, SD=.7)

******N OF CASES= 65*****

CORRELATION MATRIX (PEARSON'S)

	TERM	KNOWN	ESTUSE	NO ONE	OTHACT
LEVEL	.25	.26	.46	.29	.02
TERM		.26	.21	.09	.05
KNOWN			.26	.10	.10
ESTUSE				.15	.07
NO ONE					.09

STEPWISE MULTIPLE REGRESSION

FACTOR	MULT R	R SQUARE	BETA
ESTUSE	.46	.21	.38
NO ONE	.51	.26	.21
TERM	.53	.28	.12
KNOW	.54	.29	.11
OTHACT	.54	.29	-.04

Step 5 F=4.8, p= <.01

Table 2-17

Stepwise Multiple Regression

Determinants of Number of Hours of Use at Follow-Up

CORRELATION MATRIX (PEARSON'S)

	TERM	KNOWN	ESTUSE	NO ONE	OTHACT
HOURS	.31	.48	.46	.22	.08
TERM		.26	.21	.09	.05
KNOWN			.26	.10	.10
ESTUSE				.15	.07
OTHACT					.09

HOURS= Number of Hours on Line at Follow up (X=30, SD=37.8)

N of cases= 65

See Preceeding Table for Other Variable Definitions

STEPWISE MULTIPLE REGRESSION

FACTOR	MULT R	R SQUARE	BETA
KNOWN	.48	.23	.35
ESTUSE	.59	.35	.32
TERM	.61	.37	.14
NO ONE	.62	.38	.13

Step 4 F= 9.3, p= <.01

Limitations

The fact that no observed relationship occurs for some variables which might be expected to be related to amount of use of the system does not mean that they definitely will not affect system acceptance. For some variables, such as sex, age, and education, we do not have enough subjects across the range of categories to permit any significant differences to easily emerge. For others, our indicators may be poor or may be important only within the context of other group or individual characteristics. An example of the latter is that, although we found no overall significance for typing speed, typing ability was found to affect system use by Kerr (1980), whose White House Conference group was older and not composed of scientists; and to affect those with a negative perception of the system in Edward's study.

Implications

We have seen that the strongest predictor of level of use of EIES is the participant's own estimate of the time that will be spent on line, before ever using the system. This result is more of a puzzle to be solved by further research than an answer to the question of determinants of use. One observed correlate is the number of prospective system members whom one already knows, and thus anticipates communicating with. But what other factors account for the formation of such pre-use expectations? Did they hear a presentation on the system, participate in a demonstration, read a book or article? Do the findings imply that it is important to systematically orient and inform users about a system before giving them a chance to sign on line? Such questions might be answered with a controlled experiment, in which some group members are given a formal introductory lecture or set of general readings, and others receive only documentation or have to use the system "cold." Still another possibility is the unmeasured factors of basic personality or work style traits, or perhaps a "hunger" for more communications. Users do seem to "know" ahead of time whether or not they will like this form of communication.

Thus, whatever explains pre-use expectations or "receptivity" to this form of communication, the practical implications are clear. If prospective conferencing participants do not expect to use the system very much, it is probably a waste of resources to try to put them on line. Perhaps CC is like sex in this regard: you enjoy it a lot more if you really want it before you get it, rather than having it thrust upon you.

APPENDIX TO CHAPTER TWO

CROSS TABULATIONS OF REASONS LIMITING USE BY ACTUAL AMOUNT OF USE

Importance of Red Notebook Documentation
In Limiting Use of EIES,
by Time on Line in June, 1978 or at Follow Up

C umulative Hours	Very Important	Somewhat Important	Not Important	N
<5	8%	24	68	75
5-19	2%	42	56	57
20-49	5%	20	75	40
50-99	13%	13	73	15
100+	0	0	100%	8
Total	6%	27	68	195

Gamma= -.13
Chi Square=16.2, p=.04

Importance of Terminal Access
In Limiting Use of EIES,
by Time on Line in June, 1978 or at Follow Up

C umulative Hours	Very Important	Somewhat Important	Not Important
<5	19%	26	55
5-19	19%	12	69
20-49	25%	20	55
50-99	7%	7	87
100+	13%	0	87

Gamma= -.15
Chi Square=11.8,p=.16
Source: Follow-Up Questionnaire
All Groups
NOTE: N in all categories is same as above, for this and subsequent tables

Importance of System Being Too Complicated In Limiting Use of EIES, By Time on Line in June, 1978 or at Follow Up

C umulative Hours	Very Important	Somewhat Important	Not Important
<5	7%	13	80
5-19	17%	37	46
20-49	5%	33	62
50-99	0	33%	67
100+	0	0	100%

Gamma= .12
Chi Square = 25.5, p=.001
Source: Follow-Up Questionnaire
All Groups

Trouble with Telephone In Limiting Use of EIES, By Time on Line in June, 1978 or at Follow Up

C umulative Hours	Very Important	Somewhat Important	Not Important
<5	11%	8	81
5-19	12%	15	72
20-49	10%	25	65
50-99	0	27%	73
100+	0	50%	50

Gamma= .20
Chi Square=15.4,p=.05
Source: Follow-Up Questionnaire
All Groups

Importance of Telenet Problems
In Limiting Use of EIES,
By Time on Line in June, 1978 or at Follow Up

C umulative Hours	Very Important	Somewhat Important	Not Important
(Dropouts)	7%	13	80
5-19	22%	22	55
20-49	20%	15	65
50-99	20%	33	47
100+	13%	50	38

Gamma= .31
Chi Square= 19.0,p=.01
Source: Follow-Up Questionnaire
All Groups

Importance of Cost of Telephone-Telenet
In Limiting Use of EIES,
By Time on Line in June, 1978 or at Follow Up

C umulative Hours	Very Important	Somewhat Important	Not Important
<5	7%	12	81
5-19	13%	7	80
20-49	5%	15	80
50-99	7%	20	73
100+	25%	0	75

Gamma= .08
Chi Square= 7.82,p=.45
Source: Follow Up Questionnaire
All Groups (N=195)

Importance of Having a Bad Experience In Limiting Use of EIES, By Time on Line in June, 1978 or at Follow Up

Cumulative Hours	Very Important	Somewhat Important	Not Important
<5	9%	15	76
5-19	16%	40	44
20-49	5%	40	55
50-99	20%	40	40
100+	0	63%	37

Gamma= .29
Chi Square=24.3,p=.002
Source: Follow-Up Questionnaire
All Groups

Importance of Limited PM Hours In Limiting Use of EIES, By Time on Line in June, 1978 or at Follow Up

Cumulative Hours	Very Important	Somewhat Important	Not Important
<5	12%	18	70
5-19	19%	19	61
20-49	33%	20	47
50-99	33%	33	33
100+	0	38%	62

Gamma= .27
Chi Square=15.3,p=.05
Source: Follow-Up Questionnaire
All Groups

Importance of Not Knowing How To Type
In Limiting Use of EIES,
By Time on Line in June, 1978 or at Follow Up

C umulative Hours	Very Important	Somewhat Important	Not Important
<5	7%	10	83
5-19	4%	17	79
20-49	8%	22	70
50-99	0	7%	93
100+	0	25%	75

Gamma= .08
Chi Square=6.99,p=.53
Source: Follow-Up Questionnaire
All Groups (N= 195)

Importance of Not Liking System Like This
In Limiting Use of EIES,
By Time on Line in June, 1978 or at Follow Up

C umulative Hours	Very Important	Somewhat Important	Not Important
<5	4%	8	88
5-19	6%	7	87
20-49	0	10%	90
50-99	0	0	100%
100+	0	13%	87

Gamma= -.15
Chi Square=5.00,p=.75
Source: Follow-Up Questionnaire
All Groups

Importance of No One On System To Communicate with In Limiting Use of EIES, By Time on Line in June, 1978 or at Follow Up

C umulative Hours	Very Important	Somewhat Important	Not Important
<5	12%	21	67
5-19	5%	12	83
20-49	3%	17	80
50-99	0	7%	93
100+	0	0	100%

Gamma= -.40
Chi Square=12.3,p=.13
Source: Follow-Up Questionnaire
All Groups

Importance of Lack of Interest in Subjects In Limiting Use of EIES, By Time on Line in June, 1978 or at Follow Up

C umulative Hours	Very Important	Somewhat Important	Not Important
<5	9%	12	79
5-19	5%	20	75
20-49	2%	20	78
50-99	0	27%	73
100+	0	13%	87

Gamma= -.02
Chi Square=6.43,p=.6
Source: Follow-Up Questionnaire
All Groups

Importance of Priority of Professional Activities In Limiting Use of EIES, By Time on Line in June, 1978 or at Follow Up

C umulative Hours	Very Important	Somewhat Important	Not Important
<5	55%	21	24
5-19	51%	30	19
20-49	43%	35	22
50-99	27%	47	27
100+	13%	62	25

Gamma= -.17
Chi Square=11.7,p=.16
Source: Follow-Up Questionnaire
All Groups

Importance of Material Not Worth Reading In Limiting Use of EIES, By Time on Line in June, 1978 or at Follow Up

C umulative Hours	Very Important	Somewhat Important	Not Important
<5	10%	20	70
5-19	9%	43	48
20-49	0	40%	60
50-99	7%	27	66
100+	0	13%	87

Gamma= .02
Chi Square=15.3,p=.05
Source: Follow-Up Questionnaire
All Groups

Importance of Inadequate Leadership In Limiting Use of EIES, By Time on Line in June, 1978 or at Follow Up

Cumulative Hours	Very Important	Somewhat Important	Not Important
<5	4%	12	84
5-19	8%	18	74
20-99	0	27%	73
100+	14%	0	86

Gamma= .14
Chi Square=6.52,p=.6
Source: Follow-Up Questionnaire
All Groups

Chapter 3

VARIATIONS AMONG THE SCIENTIFIC SPECIALTY GROUPS

Among the variables which have been found to be consistently associated with reported perceptions of the characteristics of EIES as a communication medium and its effectiveness is the specific group to which a user belongs. In this chapter, selected findings will be presented which illustrate that an electronic information exchange system is to some extent a very pliable or amorphous form of communication and information exchange; perception of the system varies according to the use made of it by the members of a specific user group.

We will attempt to see if any group characteristics are strongly associated with the success of a group in using the EIES system. Our procedure will be to roughly rank the groups from more to less successful. Then we will look at some characteristics of the various scientific user groups, and see to what extent variations in these characteristics might be associated with differences in the level of success. A section which has the theme "The System Is as the User Group Does" follows. It shows how the same system is characterized or rated very differently according to the group membership of the rater. Finally, we will note that considerable "electronic migration" occurred among groups by the end of the operational trials, so that group differences began to blur.

A Note on the Composition of EIES Groups

The EIES user groups are not necessarily "groups" or "communities" in the sociological sense of having dense sociometric ties, nor did the operational trials groups correspond to the core members of a scientific specialty. One could have created such on-line "invisible colleges" by starting with citation analysis, locating the leading authors in a specialty and asking them to nominate other members on the basis of their desire to communicate and work together. Instead, a single scientist applied to the National Science Foundation, and nominated proposed participants whom he or she knew to be working in the area. The group leaders (principal investigators) were not necessarily among the best known or leading or best liked scientists within the specialty. As will be seen in detail in Table 3-2 below, even according to probably over-generous self-ratings of relative status within the specialty, only a quarter of the participants felt that they were at or near the top of their specialties. In terms of people they ranked as major or outstanding in the specialty, most were not on EIES (see Appendix, Preuse questionnaire, p. A 5). And the scientists themselves describe their "groups" as more of "a collection of individuals" or "a set of cliques", rather than "a well integrated research community", even at the time of follow-up.

So, in sum, we have collections of scientists working in the same specialty area, most of whom did not know one another before EIES use, rather than true "groups" of scientists.

VARIATIONS IN OVERALL DEGREE OF SUCCESS

There are many ways of measuring the success of a computerized conferencing effort for the members of a user group. We might have gathered a behavioral measure consisting of the extent to which the members felt so strongly about the value of the system that they actively proselytized to bring new members onto the system. We might have counted the total volume of material they created and read. Any one or two indicators are not valid in accurately judging the success of a specific group. Rather, we wish to use a measure that will roughly rank order the various groups as more or less successful in their use of EIES.

We will use two measures of "success" of the operational trials activities for group members. One is the proportion of group members who spent enough hours on line that one can presume that they were participating in some activity that they felt to be valuable. The second is subjective ratings of the productiveness or value of the system by those who used it fairly actively. Since most of our subjective ratings of characteristics of the EIES system were included on the follow-up questionnaire, we want to use hours on line measures from the same point in time.

Looking first at hours on line, it will be remembered that at the three-six months follow-up point, the proportion of group members who had spent 20 or more hours on line varied as follows:

Group	Group #	% 20+	Rank
Futures	30	46%	1
Social Networks	35	43%	2
General Systems	40	34%	3
Hepatitis	80	30%	4
Information Sci	50	25%	5
Devices	45	17%	6
Mental Workload	54	10%	7

We will use as an indicator of the subjectively rated value of EIES the mean rating of group members at follow up of how "productive" or "unproductive" the system was. This was rated on a seven-point semantic differential scale (1= productive; 7=unproductive).

Group	Mean	Rank
45	2.90	1
30	2.95	2
40	3.24	3
[80]	3.33	4
35	3.60	5
54	4.12	6
50	4.40	7

F=2.2, p= .06

A technical note first-- Group 80 (Hepatitis) is shown in parentheses because although the same question was used, it was not administered on the standard follow-up questionnaire. Whenever such data are available for this group, it will be shown in parentheses, implying we can make some inferences about the relative ranking of group 80, but that the data are somewhat different. The group 80 data are not included in statistical tests of group differences. In the above table, the "F" ratio indicates that an analysis of variance was used to test significance, and the differences among the groups are just short of the rigorous .05 level.

Combining the two kinds of information, we can roughly rank order the groups as follows:

Most successful experiences with EIES= groups 30 (Futures-mean rank 1.5) and 40 (General Systems- mean rank =3)

Middle level= groups 35 (Social Networks), 45 (Devices), and 80 (Hepatitis) (mean ranks 3.5, 3.5, and 4.0)

Least successful= groups 50 (Information Science) and 54 (Mental Workload) (mean ranks 6 and 6.5)

VARIATIONS IN CHARACTERISTICS OF THE SCIENTIFIC COMMUNITIES

The pre-use questionnaire included many items that could be aggregated to characterize the scientific user groups rather than just individual respondents. It was hypothesized that these characteristics might be important correlates of style and amount of use of the system, and of the outcome of the EIES experience for the groups that used it.

First, some variables that might be expected to correlate with group, but which in fact did not. We have seen that both expected use of the system before ever signing on and the number of group members known before use of EIES correlates highly with one of our components of group success, time on line. However, there is no significant relationship between these important variables, and group. The differences which do exist among the groups in the number of members who knew each other before using EIES are not significant. The groups in which there were the largest proportions of members knowing one another before use of EIES were in fact not among the most successful-- 35 and 54. Looking at expected use of the system before signing onto EIES, the only clear difference is between group 54 (Mental Workload) and the others. Over half of its members anticipated signing on less than once a week, according to their responses on the pre-use questionnaire. Thus, the least successful of the five operational trials groups on which we have complete data started out the most negative.

Table 3-1 shows that none of the scientific communities using EIES had a universally agreed upon "mainstream" or "paradigm" in Kuhn's terminology. There is no apparent relationship within the ranges observed between the degree to which there was a mainstream and the group's use of and reactions to EIES.

Table 3-2 shows in more detail a point already covered in the previous chapter. The groups did differ in terms of the proportion of relatively well-known scientists, and the larger proportions of well-known members occured in the more successful groups. Group 30 clearly had the largest proportion of relatively well-known members, while the least successful group (54) had the fewest (only 14%). (Group 50 data are missing for this question and all pre-use measures).

Table 3-3 shows the perceived amount and type of competitiveness, by group. There are some clear differences in the amount of perceived competitiveness. Though there is not a one-to-one correlation, the two most successful groups had the largest proportions of members perceiving low or non-existent overall competition. In terms of types of competition, there is a suggestion that fear of unethical behavior among one's peers was most prevalent in the least successful group. However, the number of respondents was so small that the differences cannot be considered significant for that question. Taken together, however, low or non-existent competitive pressures in terms of perception of intense competition and trust that one's colleagues will not compete unethically are supportive of the success of a computerized conferencing user group. On the other hand, perceived competition on the basis of opposing views or theoretical paradigms seems to be healthy for computerized conferencing groups;

groups 30 and 40 had the highest reports of this form of competition, and the least successful group had no reports of intellectual competition at pre-use.

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Table 3-1

IS THERE AN INTELLECTUAL MAINSTREAM
BY SPECIALTY GROUP

Group	% yes	N responding
30	54%	13
35	27%	22
40	33%	30
45	71%	14
54	50%	6

Chi square= 8.7, p=.07

Source: Pre-Use Questionnaire Question: Is there a commonly accepted "intellectual mainstream" in the specialty?

Table 3-2

How Well Known Participants Were in Their Specialty Areas

	30	35	40	45	54	All
1 (practically unknown)	14%	9%	23%	15%	14%	16%
2	7%	4%	20%	15%	14%	13%
3	7	9	7	31	0	10
4 (average)	7	22	17	15	29	17
5	21	35	10	0	29	18
6	21	13	17	8	14	15
7 (tops)	21	9	7	15	0	10
N responding	14	11	9	15	7	65

Source: Pre-Use Questionnaire

Question: How well known is your work, within your specialty area?

: 1 : 2 : 3 : 4 : 5 : 6 : 7 :

Practically Unknown	Average	Ranked at Top of field

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Table 3-3

PERCEIVED DEGREE OF COMPETITION BY GROUPS

GROUP	VERY INTENSE OR INTENSE	MODERATE	LOW OR NON-EXISTENT	NUMBER RESPONDING
30	9%	55%	36%	11
35	24%	57%	19%	21
40	16%	39%	45%	31
45	43%	50%	7%	14
54	0%	100%	0%	5
TOTAL	21%	51%	28%	82

Chi square = 16.6, p = .03

Source: Pre-Use Questionnaire

Question: How would you rate the degree or intensity of competition within your specialty?

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Table 3-4

% CHECKING SPECIFIC REASON FOR COMPETITION BY GROUP

GROUP	FUNDS	RIVALS	DRIVE	UNETHICAL	OPPOSING
30(N=10)	18%	0%	50%	10%	50%
35(N=20)	21%	55%	65%	5%	30%
40(N=25)	32%	20%	44%	4%	36%
45(N=13)	21%	31%	61%	15%	8%
54(N=5)	9%	20%	20%	40%	0%
Chi square	2.5	11.9	4.5	7.2	7.7
p	.64	.01	.33	.12	.10

Source: Pre-Use Questionnaires

Number Responding = 73

Question: What are the reasons for this competition? (Check all that apply.)

Scarcity or competition for funds
Rival groups of collaborators
High achievement or success drive of people in field
Some persons act unethically
Strongly opposing views

Norms and Counter-Norms in the Scientific Communities

The norms of science are supposed to stress emotional neutrality and the irrelevance of personal attributes in judging scientific work (See Merton, 1973). That such a scientific ethic exists has been challenged by Mitroff (1974a). Working with Mitroff, two sets of questions were designed to test the perceptions of scientists about the fundamental value commitments which characterize their scientific specialties.

Tables 3-5 through 3-8 indicate considerable prevalence of the "counter-norms," and also some differences among specialties. Although the number of respondents to the question is small, the futurists are unanimous in their opinion that emotional commitment to one's own ideas is characteristic of work in this field. The specialty in which there are the fewest members believing intensely in their own ideas rather than maintaining neutrality until hypotheses are proven is the Devices for the Handicapped area. Even here, commitment is judged much more frequent than neutrality. The two groups which seem to have been the most successful also have the clearest majorities characterizing their peers as emotionally committed rather than neutral (affectivity vs. affective neutrality, in Parson's terms.)

When asked about their own behavior, the results swing a little more towards neutrality (27% reporting neutrality as more characteristic, 23% saying both govern equally and 50% reporting commitment to be more characteristic of their work). Moving on to which principle "ought to" govern work in the specialty, we have a total of 31% saying neutrality, 30% both equally or neither and 39% commitment. Examined according to scientific group, the patterns of difference for which principle "ought to govern" behavior are similar to those which are reported to actually govern behavior, but the differences are not as significant (p=.15). Some of the futurists (14%) say that neutrality ought to govern behavior, but the majority (54%) say commitment ought to.

Looking at table 3-6, we see that the EIES scientific communities believe that personal attributes are taken into account in judging scientific work in their field: "particularism" rather than "universalism" reigns. The only exception is Group 35, social networks theory, where opinion is more evenly divided. In terms of actual reported behavior, there are some significant differences among groups (Table 3-7), with groups 30 and 45 having the most individuals who say that they personally use particularistic standards in judging the work of others.

An interesting lack of consensus appears in Table 3-8. The members of the various scientific user communities cannot agree on whether or when their relatively new field: largest proportion feeling that it is still not a recognized specialty. Groups 40 (General Systems Theory) and 54 (Mental Workload, or human factors more generally) are the only specialties in which a clear majority feels that they have been recognized for at least a decade.

Table 3-9 presents another piece of evidence about the relatively "unformed" nature of the scientific communities which used EIES. None of them are felt by their members to be an integrated research community, but are rather described as just a "collection of individuals" or a set of cliques.

Whether the prevalence of the "counter-norms" held by these scientists can be accounted for by the relative newness and lack of a mainstream intellectual tradition, or whether the counter-norms might be equally prevalent in older, more established specialties, is an interesting question that cannot be answered with the data from this study.

The final table in this series (3-10) shows that with the exception of Group 35, most of the EIES users did not choose to work in relatively well established research areas, but wanted the risk and excitement of working in a new area. The more successful groups seem to have more members who spurn traditional or established areas of scientific work.

Table 3-5

WHETHER EMOTIONAL NEUTRALITY OR EMOTIONAL COMMITMENT GOVERNS BEHAVIOR OF SCIENTISTS, BY SPECIALTY GROUP

Group	Emotional Neutrality More	Equal	Emotional Commitment More
30(N=13)	0%	0%	100%
35(N=20)	30%	20%	50%
40(N=31)	23%	13%	64%
45(N=14)	21%	36%	43%
54(N=7)	29%	14%	57%
Total(N=85)	21%	17%	62%

Chi square = 13.7 p = .08

Source: Pre-Use Questionnaire

Question: General Principles of Science

Described below are two sets of conflicting general principles which can guide the conduct and evaluation of scientific research. Please read each set of principles with your specialty area in mind.

Principle A. Emotional Neutrality

Scientists must be emotionally neutral and impartial towards their ideas if they are to stand a fair chance of ultimately being proved valid. Conducting an investigation with anything less than an impartial frame of mind poses the danger that the scientist will bias the results and be unable to give up the hypotheses when they are indeed false.

Principle B. Emotional Commitment

Scientists must be emotionally committed to their ideas if they are to stand a fair chance of ultimately being proved valid. Unless a scientist believes intensely in his or her own ideas and does everything legitimately in his power to verify them, there is the danger that he will give up on his ideas too quickly. Initial inconclusive signs of negative evidence do not warrant a reordination of research efforts. The scientist must believe in himself and his own findings with great conviction.

On the basis of your own experience and observations, to what extent does each of the principles tend to govern the everyday working behavior of most scientists of your specialty? (Please circle one number.)

A	A		B	B
Significantly More Than B	Moderately More Than B	Both Equally	Moderately More Than A	Significantly More Than A
1	2	3	4	5

Responses to 1 and 2, 4 and 5 were combined

Table 3-6

THE RELEVANCY OF PERSONAL ATTRIBUTES TO MOST SCIENTISTS IN SPECIALTY BY GROUP

Group	Irrelevancy	Equal	Relevancy
30(N=13)	31%	15%	54%
35(N=20)	40%	15%	45%
40(N=31)	35%	10%	55%
45(N=14)	14%	14%	71%
54(N=7)	29%	14%	57%
Total	32%	13%	55%
"Ought to"	53%	23%	24%

Chi square = 3.4 p = .9

Source: Pre-Use Questionnaire

Question:

Principle C: The Irrelevancy of Personal Attributes

The personal attributes of a scientist are completely irrelevant in judging results and claims to knowledge. Each claim in science is judged impartially on its own merits by its ability to stand up to rational, empirical test procedures without reference to the particular scientist.

Principle D: The Relevancy of Personal Attributes

The personal attributes of a scientist are highly relevant in judging results and claims to knowledge. In reality the work of some scientists is given credence over that of others. It is necessary to know the personal characteristics, background and motivations if a scientist before one can properly evaluate his or her work.

As above, we wish you to indicate the extent to which these two principles tend to govern the everyday working behavior of most scientists in your specialty; tend to govern your own everyday working behavior; and ought to govern the behavior of scientists in your specialty.

Table 3-7

WHETHER PERSONAL ATTRIBUTES ARE RELEVANT OR IRRELEVANT TO ONE'S OWN JUDGEMENT OF SCIENTIFIC RESULTS, BY SPECIALTY GROUP

Group	Irrelevancy	Equally	Relevancy
30(N=14)	29%	14%	57%
35(N=23)	56%	0%	44%
40(N=31)	45%	19%	23%
45(N=14)	7%	21%	71%
54(N=7)	57%	14%	29%

Chi square = 20.6 p= .06 (uncollapsed categories)

Question: See preceeding table

Table 3-8

REPORTED NUMBER OF YEARS SINCE RESEARCH AREA BECAME RECOGNIZED, BY SPECIALTY GROUP

Group	Not yet recognized	Less than 5 years ago	5-9 years	10-19 years	20+ years
30(N=13)	23%	0%	23%	54%	0%
35(N=21)	14%	33%	29%	5%	19%
40(N=28)	4%	29%	4%	18%	71%
45(N=12)	0%	5%	58%	17%	8%
54(N=6)	17%	19%	17%	50%	17%
Total(N=80)	10%	13%	22%	23%	32%

Chi square = 60.7 p = .00

Source: Pre-Use Questionnaire

Question: What is the approximate year in which your specialty became recognized (or will become recognized) as a separate and distinct research area?

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Table 3 -9

Cohesiveness of Research Community by Group

GROUP	Individuals	Cliques	Integrated	Number Responding
30	35%	50	15	20
35	33%	67	0	24
40	52%	45	0	29
45	30%	45	20	20
50	60%	20	20	5
54	25%	63	13	8

Chi square= 17.6   p.= .29

Source: Follow-Up Questionnaire

Question: At the present time, which of the following best describes your EIES group?
- -more a collection of individuals than a research community
- -a set of cliques or subgroups with interests and activities in common, but not an integrated community
- -a well integrated research community that shares many interests and activities in common

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Table 3-10

PREFERENCE FOR WORKING IN ESTABLISHED RESEARCH AREAS, BY SPECIALTY GROUP

Group	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
30(n=16)	6%	6%	56%	31%
35(n=23)	50%	23%	27%	20%
40(n=32)	0%	38%	56%	6%
45(N=14)	0%	43%	50%	7%
54(N=7)	0%	71%	29%	0%
Total	2%	34%	53%	11%

Chi square = 18.7 p = .10

Source: Pre-Use Questionnaire

Question: I prefer to work in well-established research areas. (Strongly agree, agree, neither agree nor disagree, disagree, stongly disagree. Note that no EIES members strongly agreed.)

TOTAL GROUP CONFERENCE ACTIVITY AND CONTRIBUTIONS BY THE GROUP LEADERS

Table 3-11 shows data on the main group conferences for each group. (Group 50's conference was erased after completion and could not be analyzed.) We see that the groups varied widely in terms of the amount of activity in their main group conference. Group 30, Futures research, was by far the largest conference, and attracted many members outside of its original members, once it became one of the most active conferences on the EIES system. The group leader was extremely active, contributing more than 300 comments to the conference over the course of the discussion.

The second most active conference was 40 (General Systems), according to all measures-- the total number of members, total comments written, and number of comments contributed by the group leader.

Thus, the most sucessful groups are the ones which had the most active conferences. Though group members do many things on line besides participate in the common group conference, its success seems central to the perceived quality of the whole experience on line.

Group 35 (Social Networks) is something of a special case. After approximately a year of general discussion, about half of the group membership was purged, and a second, task-oriented conference was begun. It is the data for the second of group 35 's conferences that is still available for analysis. Group 54 (Mental Workload) had the smallest, least active conference, especially considering the size of its membership. It also had the fewest comments contributed by a group leader.

Group 80 (Hepatitis) is also a special case. This was an explicitly egalitarian task-oriented conference, in which each person had a designated part of the division of labor. Thus, the nominal leader of the expert group contributed only 13% of the items (but 21% of the total lines written; he tended to have longer comments than the average member).

Many factors may account for these variations in activity and apparent success of the main group conferences. One is the extent to which the conference was able to be focussed on some topics that were interesting and important to the group members. A second, related factor is the level of effort and skill of the group leader. In observing the conferences from week to week, it could be seen that if a group leader went on vacation or otherwise disappeared for more than a week at a time, the conference activity tended to become disorganized and then drop off sharply. The group conferences needed a strong, active leader to keep the discussion organized and moving in a way that was satisfying to the participants. Table 3-12 shows an almost perfect rank order correlation between the leader's effort as measured by time on line and our measures of the overall success of the group.

Leadership could be split between two persons. For example, group 80 had a "content" leader who was an expert on the subject being discussed and a "process" leader. Leadership could also rotate. For instance, after the official end of the operational trials, when the leader of group 30 became much less active, conference leadership shifted to another member of the group. Variations in levels and proportions of participation in conferences will be treated in much more detail in a report based on extensive analyses of the EIES monitor data (Turoff and Hiltz, forthcoming).

The Role of a Conference Leader

One of the "latecomers" to the operational trials established and led a futures-oriented conference which attracted many members of groups 30 and 40 and other participants after the official end of the Operational Trials. He has documented the role played by a consciencious conference leader, and the kinds of activities which account for the large proportion of comments contributed by the leader in most sucessful conferences (Caldwell, 1981). Some of his generalizable descriptions of the leadership role are excerpted below:

> The role of a moderator is similar to that of a committee chairman in face-to-face meetings while allowing for the additional unique computer conferencing processes and while not having to worry about some of the meeting characteristics which relate to physical presence.
>
> . . .At the minimum the moderator must enter new members into the conference (once that is done conference members may delete themselves). However, the full responsibilities of a moderator should involve more than this but will vary by conference membership, subject matter, conference activity level, and the personal style of the moderator and members. . .
>
> The conference moderator needs to provide some number of comments which are purely administrative (as opposed to serving as a member of the conference if desired). While the moderator should take the responsibility of making decisions about the conference management it seems reasonable to expect some form of member feedback to assist that decision making. In addition, it may prove helpful to insert certain comments which provide data or literature references on topics relevant to the conference discussion (this could be done by any member). . .
>
> After the conference had been operating for approximately 30 comments, it was concluded (initiated by member feedback) that

> an index of every 15 items could help tie things together. In addition, a monthly progress report was provided. After about 50 comments were entered, it seemed advisable to begin an overall index where both old and new conference members could find the other indices. In this overall index there were itemized lists of the separate indices of each 15 or 30 comments summaries as well as locations of the monthly progress reports.
>
> There was also a need for providing directions of conference techniques to several of the members because the backgrounds ranged from members who had started with EIES several years ago and others who had just joined. Accordingly, there were special comments written to provide instructions on how to vote, how to delete comments, how to set conference markers, how to use the associated comment number to advantage, and how to write special commands for effeciency of time. A special conference comment was written which incorporated many of these suggestions and was used to introduce new members to the conference (along with the overall index). Thus, a new member was entered and a message was sent indicating the location of the "hints" comment and the overall index. . .
>
> In this conference, the moderator accounted for 42% of all comments. Most of the time the purely administrative comments (indices, progress reports, member feedback, voting) ran at 20-25% of the total comments. . .
>
> The time devoted to conference management by the moderator depends on the amount of administrative experience, familiarity with the EIES system, and the particular administrative mode required of the conference. In this conference, the development and entering of the monthly progress report took approximately 30 minutes and the indexing of each 30 comments took about 40 minutes. General evaluation of activities and reflections on how to modify conference directions took an estimated three hours per month.

The level of activity by the Group 45 leader corroborates Caldwell's observation that process-oriented activity by a consciencious conference moderator may account for 20-25% of the total number of items. Jane McCarroll, the moderator/leader for Group 45, points out that unlike the other group leaders, she was not herself a member of the scientific community whose activity she facilitated. That is, she was not herself engaged in the development or testing of devices for the handicapped, though she was familiar with the area. Thus, her contributions were by definition mostly process oriented rather than substantive; yet they took 22% of the items in the conference.

Table 3-11

Group Conference Activity

Conf	Members	Comments	# by Leader	% by Leader
30	61	1278	312	24%
35	22	289	33	11%
40	45	389	73	19%
46	34	237	52	22%
54	23	138	30	22%
80	11	265	33	13%

Source: Monitor Statistics

Table 3-12

CUMULATIVE TIME ON LINE BY GROUP LEADER AS OF APRIL 3, 1980

Group	Total Hours By Leader	Leader Hours Rank	Group Success Rank
30	765	1	1
40	755	2	2
45	557	3	3.5
35	320	4	3.5
80	293	5	5
54	129	6	6

Ratings of the Group Leader

The only group where a significant portion of the members listed inadequate leadership as a reason which dissuaded them from using EIES was Group 54. Five of sixteen group 54 respondents to this question (31%) checked this factor as "important."

In response to a direct question which asked "How would you rate the performance of your group leader (principle investigator)"

excellent 1 2 3 4 5 poor

only groups 50 and 54 have a significant proportion rating the leader below "2," as shown in table 3-13. Although there are other factors which also contributed to the lack of success of these two groups, relatively inactive leaders does seem to be an important factor.

Table 3-13

Ratings of Group Leader, by Group

Group	Excellent	2	3-5	N responding
30	55%	25%	20%	20
35	48%	30%	22%	23
40	62%	27%	11%	26
45	56%	28%	17%	18
50	0%	60%	40%	5
54	43%	28%	29%	7

Source: Follow-Up Questionnaire

Chi square = 14.9 p = .78 (not significant)

VARIATIONS IN SUBJECTIVE REACTIONS TO THE SYSTEM, BY SPECIALTY GROUP

In this section, we will look at some examples of ways in which the same objective capabilites or qualities of the EIES system are differentially perceived and rated, depending on the group context in which a person uses the system. First we will examine the reported responsiveness of people to electronic messages on EIES, which is one measure of the effectiveness of the message component of the EIES system.

The message system is designed as a replacement for letters and telephone calls. Of course, it is effective only if members sign on to receive their messages regularly, and answer them rather than ignore them.

Generally, Table 3-14 shows that the electronic message is seen as more effective than or equally effective as a telephone call or letter. It should be noted that the two groups for which perceived effectiveness is not particularly good are the smallest. It has previously been hypothesized (Hiltz and Turoff, 1978) that there is a critical mass phenomenon. There must be a large enough number of active members of a user group who sign on daily or almost every day to generate the motivations for all members to sign on frequently and to enter communications into the system. Otherwise, the pattern of daily sign on which is necessary for such a system to be an efficient (speedy) communication system is negatively rewarded by "no new items waiting" when a member signs in, and members are discouraged.

Table 3-14

Responsiveness to EIES messages, by Group

GROUP	More Responsive	Less	No Diff.	N
30	55%	20	25	20
35	42%	12	46	24
40	36%	20	44	25
45	40%	35	25	20
50	0	80	20	5
54	14%	43	43	7
all	39%	26	33	101

Chi Square= 21.2 p= .13

Source: Follow-Up Questionnaire

Question: When you send a message over EIES rather than writing or telephoning, would you say that recipients are generally

-More responsive to an EIES message
-Less responsive
-No difference

Table 3-15

HOW OFTEN USERS FEEL DISTRACTED BY THE MECHANICS OF THE EIES SYSTEM, BY GROUP

Group	Always or Almost Always	Sometimes	Almost Never	Never
30(N=21)	29%	48%	19%	5%
35(N=25)	8%	60%	28%	40%
40(N=28)	14%	46%	32%	7%
45(N=21)	14%	57%	14%	14%
50(N=5)	60%	40%	0%	0%
54(N=8)	63%	12%	25%	0%
Total(N=108)	21%	49%	23%	6%

Source: Follow-Up Questionnaire

Chi square = 34.1 p = .03

There were consistent though not always statistically significant differences in most other perceived characteristics of the EIES system associated with group. Table 3-15 indicates that only the members of the user groups that had the least successful field trials on the system tended to frequently feel "distracted by the mechanics of the system." Whether EIES is stimulating or boring, frustrating or not frustrating, is also greatly influenced by group membership (Tables 3-16 and 3-17). Groups 30, 40 and 45 are consistently the most positive; groups 50 and 54 consistently the most negative.

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Table 3-16

EIES Is...Stimulating - Boring

(Seven-Point Scale)

(1= Stimulating 7= Boring)

GROUP	1-2	3	4	5-6	Total N	Mean
30	65%	26	0	9	23	2.22
35	56%	24	16	4	25	2.56
40	59%	34	0	7	29	2.38
45	62%	14	19	5	21	2.43
50	40%	20	0	40	5	3.40
54	25%	50	0	25	8	3.13
[80]	58%	17	17	8	12	2.67

Analysis of Variance F= 1.40 P= .23

Chi Square (uncollapsed data)= 45.6 P= .0007

Table 3-17

Whether EIES is "Frustrating" by Group

Seven-Point Scale

(1= Not Frustrating   7= Frustrating)

GROUP	1-2	3	4	5	6-7	N	X
30	17%	22	13	35	13	23	4.04
35	20%	12	28	20	20	25	4.12
40	28%	31	21	17	3	29	3.34
45	19%	24	24	29	5	21	3.57
50	0	40	20	0	40	5	4.40
54	0	12	25	25	38	8	4.88

Source: Follow-Up Questionnaires
Chi Square (uncollapsed data) = 4.28   P= .06
Analysis of Variance F= 1.88   P= .10

Blurring Among Groups

As the Operational Trials proceeded, many members of the various scientific communities officially joined other groups and conferences in addition to their own. In the table below, one sees, for instance, that of the 24 members of Group 30 on line at the end of the operational trials, four were also members of Group 35, eight of Group 40, etc. One has to total the numbers above and to the right to read the entire table. For example, of the 66 members of Group 40, seven were also in Group 35 and five were also in Group 45. Migration into two of the groups not included in this study (60, JEDEC, and 70, LEGITECH) are shown for completeness. Groups 30 and 40 had attracted the most cross-memberships with other groups, and Group 54, the least. By this point, many nominal members of the various scientific communities were actually spending more of their on line time participating in another group's conferencing activity than in their own.

Table 3-18

NUMBER OF COMMON MEMBERS BETWEEN GROUPS

April 1, 1980

G	30	35	40	45	54	60	70	80
30	24	4	8	3	1	1	5	1
35		25	7	2	0	1	4	1
40			66	5	0	1	9	1
45				30	0	0	5	1
54					21	0	0	0
60						50	1	0
70							36	1
80								16

Source: EIES Monitor data

Summary

1. The scientific user groups on EIES were collections of individuals and cliques in the same research specialities, rather than "groups" in the sociological sense.

2. A relative group success index was generated using a combination of the proportion of members who spent at least 20 hours on line, and subjective satisfaction with productivity gains as a result of using the system. Group characteristics were compared to relative success. We find that:

a) The research specialties represented on EIES do not have an agreed upon "mainstream" or paradigm of theoretical and methodological principles. Within the range of low to medium paradigm groups observed, there is no relationship between extent of paradigm and relative success.

b) Intellectual competition within a specialty appears to stimulate use of the system; other types of competition may hinder it.

c) In terms of the pattern variable emotional committment ("affectivity") vs. neutrality, the more successful groups have the highest proportion of members who tend to believe intensely in their theories, rather than maintaining neutrality until hypotheses are proven.

All of the groups tended toward "particularism" rather than "universalism."

d) Most EIES scientific users prefer to work in new research areas rather than in well established areas; the more sucessful groups tended to have the largest proportions of would-be pioneers in new research areas.

e) The amount of on-line activity by the leader seems to be strongly related to the success of the group.

3) There are correlations between the overall "success" of a group's efforts on line, and the subjective impressions of the system formed by group members. For example, the least successful groups are most likely to feel "distracted by the mechanics" of using the medium, and to find the system itself to be "boring" and "frustrating."

4) Although users typically join the system as members of a specific group, as they gain experience they tend to communicate with members of other groups, too, and to join other conferences. Initially distinct user groups become overlapping networks. Interesting, well led conferences thrive and grow, attracting members from other groups, while other conferences essentially grow moribund and the group members stop communicating with one another on a group basis.

User groups within conferencing systems might be compared to subcultures within a society. Being a member of one group (subculture) rather than another seems to shape the experiences of the members and the quality of their (electronic) life.

Chapter Four

THE EVOLUTION OF USER BEHAVIOR

(Coathored with Murray Turoff)

This chapter examines changes in the behavior and attitudes of users in relation to specific features of the system, changes which have some design and policy implications. There are many other aspects of changes in the behavior and attitudes of both individual users and user groups over time which are not treated here, such as changes in perceptions of the usefulness of the system for various communications function (see Chapter five), subtle changes in the style and richness of written communications (see Carey, 1980, for a description of paralinguistic behavior), and changes in the social organization and productivity of user groups (see Chapters six and seven).

INTRODUCTION

Since the earliest observations, those who have studied comptuter-based communication have recognized that, as Johansen (1976) states, "initial uses of teleconferencing systems often serve as a poor basis for generalizing about future uses." The data from this study provide, for the first time, detailed empirical evidence about changes in user behavior and preferences related to the features or capabilities of comptuter-based communication systems, as a function of experience (hours on line). They will also serve to show that amount of experience is a powerful determinant of many aspects of user reactions to systems such as EIES. As a result, all variables on all questionnaires were cross-tabulated by hours of experience, and are reported in subsequent chapter whenever they are significant.

Limitations of the Data

The reported results are limited to a single system and a single type of user (scientists). Until similar measures are replicated for other systems and other types of users, the generalizability of the specific results obtained for EIES is unknown. Another limitation is that the data currently available for analysis are cross-sectional (attitudes and behavior measured at a single point in time) rather than longitudinal studies which measure each user's amount of experience and opinions about the system at many points in time. (1)

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(1) We attempted a longitudinal analysis, but did not have enough cases in the critical ranges for proper analysis. The number of cases for which we have answers on the same question on the value of features on a first follow-up questionnaire at approximately six months after starting to use EIES and on the eighteen-month post-use questionnaire ranges from 55 to 71. However, a total of only twenty were in the range which evolved from fairly new users to experienced users during this time period. Regression analysis and Pearson's correlations on the relationship between change in hours on line and change in ratings of features showed relationships that were generally in the predicted direction, but were not statistically significant. we think that the fairly weak relationships are due to the inability to capture measures on the users at critical points in their learning behavior when relying on two questionnaires a year apart, and have chosen not to report this analysis.

However, the basic generalization to be drawn from the data, that there is indeed an "evolution" or pattern of change towards greater complexity and specialization and diversity of user behavior over time, is consistent enough with studies of other teleconferencing systems that it is not likely to be an artifact of the limitations of this study. (See Elton, 1974, and Johansen, Vallee and Spangler, 1979:136-137 for similar generalizations based upon other teleconferencing systems).

Background: The Proliferation of Simple Electronic Mail Systems

Computers are increasingly being put to work in the processing, storage, and transmission of text to facilitate human communications. The most widespread proliferation is taking place in the areas of "electronic mail" and "word processing." Uhlig (1977) comes to the same kind of optimistic conclusion about the future importance of electronic mail as do the majority of those who have studied this technology:

> During the next 50 years computer based message systems (CBMS's) will have as great an impact on the way business is done in our society as the impact that the telephone had on business practices during the last 100 years. This, at least, is what our organization has come to believe after two and one-half years of experimenting with them.

Electronic mail is usually designed with a minimal number of features, so that it can simply replicate electronically the delivery of "mail" and internal memoranda. For example, this limited set of functions is implicit in the recent paper on the design objectives of message systems by Levin and Schroeder (1979: 29) that refers to "Message systems that communicate memoranda among members of a community." Word processors are likewise being designed as specialized, single purpose systems, to be used only by secretaries acting as intermediaries between the originators and the recipients of text.

In his review of "The Outlook for Computer Mail", Panko (1977) concluded:

> Computer mail has a great deal going for it: apparently favorable economics, a huge potential market, and weakening

> postal opposition. To tap this market, a fair amount of design evolution will be required.

We agree that "design evolution" will be necessary in order to maximize the role of the computer in the facilitation of human communication. Furthermore, we believe that such evolution should be based upon feedback from the experiences of users of current systems.

EVOLUTION OF USER BEHAVIOR

After approximately eighteen months of use of the EIES system, members of the scientific user groups on line were asked to rate the perceived usefulness of a number of specific system features. If they had not used a feature at all, they were instructed to check "Cannot Say;" otherwise, they were to rate each one as "Extremely Valuable," "Fairly Useful," "Slightly Useful" or "Useless."

The data in Tables 4-1 and 4-2 show the relationship between amount of time spent on line and ratings of the usefulness of the system features. Let us look at Table 4-1 first. The first column served as the basis for ordering the features, and is simply the proportion of the total of 102 users answering these questions who rated a feature as "extremely valuable." The responses at the other end of the scale, "Useless" and "Cannot Say," have been combined to form a more nearly ordinal scale, since very few checked "useless." "Cannot say" was the response that was checked by respondents who felt so little need for the feature that they did not ever try to use it. Some of this is accounted for by poor documentation of the newest of the features, which are not included in the user manual.

Column five of Table 4-1 reports a statistic which shows the amount of relationship between the subjective rating of the value of the feature used, and amount of use of the system at the time the questionnaire was written. Gamma, the statistic used, is a correlation coefficient which varies between -1.00 and +1.00, with zero meaning no relationship. It is the most commonly used measure for ordinal scales. It is a "PRE" (Proportional Reduction in Error) measure. A gamma of .5 in table 4-1 can be interpreted to mean that if you pick any two pairs of observations in the sample, it is 50% more likely that the person who is higher in hours on the system also has the higher rating for the feature, than that they vary in the opposite direction. It can also be interpreted to mean that overall, knowledge of time on line improves our prediction of system feature rating by 50%. (See Crittenden and Montgomery (1980) for a discussion of measures of association for ordinal variables).

The last column shows the level of statistical significance of the relationship between time on the system and subjective ratings of the value of the features, based on a Chi square test. We have decided to always report results significant at the .05 level, a rough guide to the extent to which the observed patterns of association are too strong to be attributed to random variations associated with sampling error. We will usually report results significant at the .10 level, if they seem consistent with other findings, and will sometimes report findings which are even more tentative and in need of replication (findings for which the probability that the results would not hold with a large sample is greater than 10%).

The most universally appreciated features are the private message, the direct text editing necessary to make typing corrections, user consultants to help one find one's way around the system, and system commands to replace a menu-driven interface when users understand the options available. These are the types of features which are built into most electronic mail systems, with the exception that most such systems do not include the "friendly human helpers," the user consultants. However, high overall popularity ratings are also received by many features which are not usually part of electronic mail systems: group and private conferences, and the public directory of members to facilitate the formation of interest groups. In addition, we notice from gamma statistics that appreciation of many features appears to be related significantly to amount of use of the system.

This becomes clearer in Table 4-2. Here we see that beginning users do indeed see the need for only a relatively small number of features in a computer-based communication system. However, the more experience they gain, the more they come to feel that a wide variety of communication spaces and capabilities is necessary, and the less likely they are to be satisfied with a simple message system. The group-oriented and conferencing features become much more important, as do the features that are necessary for storage, retrieval, and manipulation of text for documents.

Table 4-1
Reactions to Specific Features of the EIES System and Correlation (Gamma) with Time-On-Line

FEATURE	EXTREMELY VALUABLE	FAIRLY USEFUL	SLIGHTLY USEFUL	USELESS, CANNOT SAY	GAMMA	P*
Private Messages	68%	22%	10%	1	.50	.09
Text Editing (direct) (e.g., /old/new/)	51%	18	6	25	.23	.47
User Consultants	50%	21	7	22	.32	.02
System Commands (e.g.,+cnm)	40%	27	7	26	.49	.01
Group Conferences	39%	33	13	15	.40	.04
Group Messages	35%	31	25	9	.06	.48
The Directory	34%	35	17	14	.21	.04
Private Conferences	33%	25	8	35	.44	.01
Retrieval	31%	31	9	30	.30	.48
Searches	27%	16	18	38	.38	.01
User Defined commands (i.e. +Define)	21%	15	5	59	.29	.001
Text Editing (indirect) (e.g., .text)	20%	16	3	61	.17	.16
+SEN and ???	18%	21	10	51	.58	.001
Chimo	17%	23	24	36	.34	.20
Private Notebooks	14%	23	7	56	.42	.001
Use of ?,??	12%	25	16	47	.11	.24
Explanation File	10%	20	19	51	.00	.82
Terminal Control Features (e.g., +left,+page)	10%	17	7	66	.22	.19
Anonymity or Pen Name	10%	13	16	61	.32	.25
Synchronous Discussions in Conferences	9%	12	16	63	.17	.65
Group Notebooks	7%	15	6	72	.03	.39
Special Programs (e.g., +terms, +respond	9%	9	6	76	.40	.12
Graphics Routines	7%	5	2	86	.42	.21
Interact Programming	5%	3	6	86	.20	.16
Tailored Interfaces (e.g.,+Legitech)	4%	6	3	87	.41	.03
Games (e.g.+story)	3%	6	21	70	.55	.002
Voting	2%	12	7	79	.18	.15

Source: Post-Use Questionnaires, N=102

*Probability that relationship could be due to sampling error, Chi Square test

TABLE 4-2: GROWTH OF FEATURES PERCEIVED AS "EXTREMELY VALUABLE" OR "FAIRLY USEFUL" AS A FUNCTION OF AMOUNT OF EXPERIENCE USING EIES

(* indicates addition to list over prior usage class)

USERS WITH 1 TO 19 HOURS ON LINE (N=26)

FEATURE	%
PRIVATE MESSAGES	81
USER CONSULTANTS	71
GROUP MESSAGES	68
GROUP CONFERENCES	58
DIRECT EDITS	63
MEMBERSHIP DIRECTORY	59

USERS WITH 20 TO 49 HOURS EXPERIENCE (N=32)

FEATURE	%	% SHIFT
PRIVATE MESSAGES	84	+3
GROUP CONFERENCES	66	+8
DIRECT EDITS	65	+2
SYSTEM COMMANDS*	64	+21
USER CONSULTANTS	59	-11
GROUP MESSAGES	62	-6
RETRIEVAL*	53	+5
PRIVATE CONFERENCES*	53	+17
MEMBERSHIP DIRECTORY	56	-3

Table 4-2, continued

USERS WITH 50 TO 99 HOURS EXPERIENCE (N=25)

FEATURES	%	% SHIFT
PRIVATE MESSAGES	96	+6
GROUP CONFERENCES	80	+14
SYSTEM COMMANDS	75	+11
MEMBERSHIP DIRECTORY	72	+16
RETRIEVAL	68	+15
USER CONSULTANTS	67	+7
DIRECT EDITS	67	+1
GROUP MESSAGES	54	-8
SEARCHES*	52	+26
? AND ??*	52	+10
PRIVATE CONFERENCES	51	-2
SEND,LINK,AND???*	50	+26

USERS WITH 100 HOURS AND OVER EXPERIENCE (N=19)

FEATURE	%	% SHIFT
PRIVATE MESSAGES	100	+4
MEMBERSHIP DIRECTORY	95	+23
USER CONSULTANTS	95	+28
DIRECT EDITS	90	+13
GROUP CONFERENCES	90	+10
SYSTEM COMMANDS	90	+15
RETRIEVAL	84	+16
GROUP MESSAGES	84	+30
PRIVATE NOTEBOOKS*	74	+44
SEN, LINK, AND ???	79	+29
USER DEFINED COMMANDS*	68	+31
CHIMO*	63	+42
INDIRECT EDITS*	63	+34
PRIVATE CONFERENCES	55	+4
TERMINAL CONTROL*	53	+46

Source: Post-Use questionnaire and Monitor Data on Accumulated Hours

EIES is, admittedly, not what it should be in terms of user documentation. As an R&D system with low levels of operational staff, there is no regular documentation effort. New features arise from user feedback via the user consultants and evaluators to the implementors. When a new feature is added, it is exposed to the user consultants, who test it and write documentation for the on-line file. Major new features are announced in CHIMO, the on-line newsletter. After that, a user must either search the explanation file or ask a user consultant if a feature exists to fill a perceived need. There is no regular mailing of updated documentation to users. As a result, a user must feel motivated to seek out new features and to learn to use them without any face-to-face training. We think that the users themselves seeking out new features after gaining experience on line makes our results more significant than they would be if they were simply responding to pushes from "advanced training seminars" or published training manuals on the features which they "ought" to learn when they feel comfortable with the basic system.

Although the likelihood that a person will find a system feature necessary or useful is generally positively correlated with use, there are a few exceptions. Some of the features for which perceived usefulness seems to be a direct function of amount of use of the system are: group messages, group conferences, private conferences, system commands (as compared to the menu selection interface), search routines, and indirect editing for formatting of output.

One interesting drop is in the perceived value of group messages, at the intermediate levels. We think that new users perceive the feature from the point of view of the sender: a convenient way to communicate with a large group. With a little more experience, however, they become aware of unwanted group messages from the recipient's point of view. Group conferences, in which receipt of an item is governed by self-selection on the basis of topic, is then seen as a more valuable, self-filtered mechanism for group communication, within the context of the EIES design.

An interesting curvilinear pattern occurs for user consultants; appreciation of them is high at all levels, but the newest and the most experienced users find them most valuable of all. This is probably because the user consultant is asked for help and human response ("Somebody talk to me!") by neophytes, and then becomes the source of "advanced knowledge" on features that are too new or complicated to be automatically retrievable by the short explanation request (? and ??). This tends to occur when users master the basic system and are ready to move on to preparing large documents in notebooks and defining their own commands.

Another complementary explanation, partially verified by observation, is that the user consultants also take on gatekeeping and information brokerage roles. They are often asked by advanced users for information on whether particular topics might be discussed and who else on the system might be interested in them. In a sense, the user consultant represents a new type of human facilitation role for the electronic information exchange environment. They also advise on effective styles of leadership for users who wish to establish a conference or other activity on line.

Looking at the pattern of changes, one can interpret them as showing that new users appreciate a system that replaces communication media with which they are familiar. These are the letter and the telephone call (replaced by the private message), and the meeting (replaced by the group conference). However, as they gain experience with the new medium, their perceptions of useful applications and their preferred styles of using the medium change.

As users gain more experience with the medium, they tend to find more valuable the unique kinds of functions which the computer can provide for asynchronous group efforts. They need features which help them to deal with "information overload," which can result from intensive daily interaction with a large number of people and groups. They also begin to use other advanced features that can be provided by a computerized conferencing system.

One can classify those features for which there is a substantial increase in perceived usefulness as a function of experience as follows:

1) Features that facilitate long-term group communication rather than one-to-one communication (the group conference and the private conference).

2) Features that allow a user to actively control the system rather than passively react to menu choices and new items automatically presented (system commands, user-defined commands, searches).

However, it should be noted that EIES members feel that the menu is the optimal interface for the beginning user.

3) Features to support composition and the preparation of larger text items and documents (notebooks, indirect editing, and terminal controls for formatting output). Note that it is only at 100 hours or more of experience that most users arrive at the point where they want to produce their large documents on line, rather than having them typed.

4) Features that permit tailoring of the system to individual and group needs (user-defined commands, special routines, and the INTERACT language).

Phases of User Behavior

One classical model of user behavior in interactive systems with which one can compare our data was developed by Bennet (1972). He generalizes user behavior into the UNCERTAINTY phase, during which the learner has to overcome hesitancy and anxiety; the INSIGHT phase, during which the user understands the general concept of the system and can make at least limited use of it for his or her own purposes; the INCORPORATION phase, when the mechanics of the interaction become second nature; and the SATURATION phase where the system is perceived as inadequate for meeting new requirements users evolve as a result of experience.

EIES users report a median of 1.7 hours to learn the basics, but there is quite a wide variation (the mean is 6.4 hours). Reaching the "Insight" phase seems to be related to becoming comfortable with the writing style and multi-strandedness of conferences, where many topics tend to be discussed simultaneously. A median of 4.5 hours is reported to feel comfortable using the system. The "Incorporation" phase appears to have occurred by fifty hours. To date, we have not observed any signs of the "Saturation" phase, except in the form of a desire to learn the INTERACT programming language and construct one's own subsystems, or have another person do the programming to specifications of the users.

There is a phenomenon of "information overload," which seems to set in on all regular users sooner or later. EIES provides many conferences and activities which users are free to join, far more than the number with which any individual can cope. The growth in publicly available conferences and the fact that a new user can go back and read a conference transcript that has been accumulating for a year or more makes the accumulated material in EIES like a data base. The plethora of available material creates a need for searches, retrieval, and the ability to select material of interest from all that is stored on line. This overload phase is now receiving considerable attention in the evolution of the EIES system design.

Incorporation or Addiction?

Some of the users who have spent a lot of time on line and have incorporated EIES into their style of work refer to themselves as "addicted," or make comments that could be interpreted as signs of addiction. Some examples of this are:

"I can't think when the system is down."

I can live without EIES, but i can't LIVE without EIES!" (conference 1003, Impacts)

(In explaining reasons limiting use on the post-use questionnaire...) "The only pressures were the need to sleep and to continue the obligations of a life that already consumed 16 to 18 hours a day. But for that I would have signed on EIES regularly once a day, for 16 hours each time."

(In response to post-use questionnaire item on changes in the way one works and thinks...) I spend 1-3 hours per day on EIES, usually in the morning, often on weekends and at night. It has become 'essential' to me."

"During and after the Berlin WFS meeting I became somewhat addicted to EIES."

A study of "ex-addicts" had been planned as part of the extension for this study. The operational trials groups were ended on April 1, 1980. The plan was to study users who had spent more than one hundred hours on line, at approximately one month and six months after their last use of EIES. However, practically all of them managed to find the funds somewhere to continue EIES membership, if only as "class 2" members paying out of their own pockets. So we have no "cold turkey" behavior to report.

CONCLUSION

The design implications of these observations are fairly obvious. Short-term pretests of inexperienced users on small-scale systems cannot be generalized to predict the preferences of experienced users on operational systems.

Users cannot tell you what they need prior to using this technology. Attempts to pre-design fixed systems, which are common in the standard data base area, are doomed to failure, unless the group setting the requirements are experienced users of the technology. The difficulty in validating this statement is that people in dire need of improved communications will utilize anything they are given which provides increased efficiency. Simple message systems will do this, but they will also leave the user in ignorance of other opportunities which this technology can offer.

In terms of the analytic implications for this study, our findings indicate that amount of experience, as measured by hours on line, is likely to be related to many aspects of patterns of use of the system and attitudes toward it. Therefore, it will be used as an independent or control variable in looking at all of the dependent variables for this study.

Perhaps CC systems are more like wine than roses. "A rose is a rose is a rose..." but experienced users of CC, like oenophiles, come to appreciate design subtleties and complexities, and to want to be able to choose just the right feature to support or complement a variety of communication activities.

Chapter Five

ASPECTS OF SUBJECTIVE SATISFACTION: LEARNING, USING, AND REACTING TO EIES

In this chapter, we shall examine in considerable detail users' opinions and reported experiences related to EIES. We shall start with descriptions of how long it takes them to learn to use it and their style of use. Then we shall proceed to examine opinions about and reactions to specific features, particularly the interface and those aspects of the system that are most and least liked.

Finally, we shall look at overall evaluations of the system both in terms of global characterizations of it as being "good" or "bad," "stimulating" or "boring," and in terms of its perceived utility for specific types of communication and information exchange functions. A multivariate analysis will be used to construct satisfaction indices and to identify the most important determinants of subjective satisfaction.

LEARNING TO USE THE SYSTEM

During the operational trials, EIES unfortunately combined a complex and evolving system with a related lack of complete, up-to-date documentation and learning guides. As a result, many users felt that it took them too long, even on a simple level, to learn to use the system and that learning the advanced features was too much of a time investment.

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At the follow-up, we asked users how long it took them to "learn to use the system reasonably well." This is a rather vague, global question. The reported median is 3.4 hours, but 17% report 10-20 hours, resulting in a mean of 4.96 hours.

At the post-use time, we broke learning down into three different aspects: the basics, feeling comfortable, and learning advanced features. Most report less than 5 hours to learn the basic mechanics, though one in five report taking longer. The median is 2.4 hours. There is no relationship between any of the measures of previous experience with using a computer or a computer terminal and the time it takes to learn the basics of EIES.

For "feeling comfortable" the median is 5.1 hours. "Feeling comfortable" is very strongly related to time on line at the time the question is asked (a correlation of .53 as measured by eta, significant at the .01 level). The more time a person had been on line, the more time in retrospect they report it took for them to feel comfortable, but the less likely they were to report that they never felt comfortable. Thus, the curvilinear coefficient (eta) is stronger than the linear one (see Table 5-1).

Learning of advanced features is, obviously, a problem with the system. About half of those with less than 50 hours of time on line never learned them at all, and one-third of the high users with 50-99 hours on line did not. The more time a person spends on line, the longer they report taking to learn advanced features. For instance, among those with more than 100 hours on line, over one-third report 30 hours or more to learn the advanced features (see Table 5-2). The difficulty of learning the advanced features and the associated feeling that the system is "too complex" also come out in many of the optional, open-ended comments about things liked least about EIES and about most needed improvements.

An alternative interpretation is that the system is "rich" rather than "too complex." It is obvious that users do not saturate even after 100 hours of experience. The designer points out that a conscious choice is made to let users know that there is an almost endless array of advanced features to be learned if they wish to learn them. By the end of the operational trials, EIES had over 500 commands above and beyond the menu functions, plus several specialized subsystems and its own programming language that users could master.

Included in the Appendix are two examples of reports on the questions asked user consultants by EIES members. These show some of the points of difficulty encountered in learning to use the system. The reports also served as one of the main mechanisms for "formative" evaluation, since reported difficulties were used as a basis for modifications to the system or its documentation.

Table 5-1

Reported Number of Hours on Line to Reach Various Learning Levels

Task	<2	2	3-5	6-10	11-97	Have Not
Learn basic mechanics	31%	20	27	14	6	2
Feel comfortable	19%	18	15	14	24	10

Source: Post-Use Questionnaire

Question: How many hours do you feel it took you to learn the basic mechanics of sending and receiving messages and comments? to feel comfortable communicating with others using this medium?

Table 5-2

Hours Taken to Learn Advanced Features,

by Time on Line

	Cumulative Hours on Line				
Hours to Learn	1-19	20-49	50-99	100+	All
<2	9%	7%	17%	0	9%
2-3	27	18	22	24	22
4-10	14	15	9	0	10
11-29	4	7	4	24	9
30+	0	0	17	35	11
Have Not	46	52	30	18	38

Source: Post-Use Questionnaire
Chi square = 37.2, p = .04
eta = .5

Question: How many hours do you feel it took you to learn the advanced features that you wanted to use?

Documentation

New users of EIES are provided with a loose-leaf red binder called "How to Use EIES." It covers all of the basic features and also includes a one-page "users' guide" that is a map of the system and a list of frequently used editing symbols, as well as a "quick start guide." The extremely condensed one page users guide is included in the Appendix. It shows the set of "menues" that are provided as the beginning interface to move around the system in order to create, modify, send, receive, and select communications of various types.

At the time of the follow-up, ratings of this documentation are quite satisfactory (see Table 5-3). Almost all find it readable and fairly easy to understand. Ease of understanding is positively correlated with accumulated time on line when the question is answered, but it is not possible to untangle the causality here. Does feeling that it is understandable lead to more use of EIES, or does more use of EIES, and therefore more use of the documentation, make it seem easier to understand? The weakest point is its organization, which one third rated as neutral or poorer.

However, this initial documentation does not cover the new and changing features of EIES that are evolving, or any of the advanced features. Moreover, a large portion of readers claim that they have not and will not read through long manuals. An on-line explanation file was constructed to serve as a comprehensive, constantly updated source of information on all aspects of the system.

From the information received from the follow-up questionnaire during the late spring of 1978, we concluded that very little use was being made of the explanation file. Only 2% rated it "extremely valuable," and 30% said they could not say anything about it because they had never used it. The user consultant file showed that the they frequently had to tell people how to look things up in the explanation file.

It was decided to modularize the on-line instruction for the evolving system with the introduction of two new features. ?WORD (i.e., ?message; ?edit) gives a paragraph to one-page explanation of any feature on EIES and can be entered at any point. Second, a system of one-line explanations invoked by a "?" entered at any point when EIES is ready for input and of half-page explanations invoked by two question marks is linked to all of the choice points. Thus, whenever a user does not know what to do or what options are available at any point in EIES, documentation can be easily retrieved.

User acceptance is somewhat better, with 12% of those in the post-use questionnaire rating this documentation feature as "extremely valuable." However, since this new style of documentation is not included in the written "How to Use EIES," those users who might have the most need for it are not likely to find out about the new documentation. It was explained in CHIMO, the on-line newsletter, which was devised as a means of keeping users informed about changes and new features as well as new groups and activities on line. But only about one-third of the system members read CHIMO with any regularity, and these tend to be the heavy users. We do not know the extent to which this "?" feature might have reduced learning difficulty for new and advanced features if it had been available earlier.

Table 5-3

Ratings of Documentation:

Follow-Up Questionnaire

Do you now find "How to Use EIES"

Understandable (1)	47%
2	38%
3	11%
4	3%
Confusing (5)	1%

Correlation with hours of use (gamma) = .47; p = .005

Easy to read (1)	41%
2	43%
3	7%
4	7%
Hard to read (5)	3%

Correlation with hours of use (gamma) = .29; p = .21

Well organized (1)	25%
2	40%
3	23%
4	9%
Not well organized (5)	2%

Correlation with hours of use (gamma) = .22; p = .17

Alternative Help Features

As a result of an evolutionary design process, EIES thus offers a wide variety of alternative means of helping users who need to learn about some aspect of the system, in addition to the written documentation. Since users are free to choose any combination of the available aids, their relative popularity may be of interest to other designers of interactive computer systems in deciding which types are most important to include.

Table 5-4 shows the reported relative frequency of use of the various on-line help aids. The most popular are the human "user consultants," described in detail below. Next most widespread use is made of the on-line newsletter ("CHIMO"). This is followed by the "?word" system, and the full explanation file is least used. However, all of them are used frequently enough so that ideally, a system should incorporate the full range.

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Table 5-4

Percent Making Frequent or Occasional Use of On-Line Help Aids, by Time on Line

Feature	Hours on Line <20	20-49	50-99	100+	All	Gamma	p
User Consultants	80	67	83	95	79	.26	.29
CHIMO (News)	56	67	87	89	73	.47	.02
? or ??	43	50	62	56	52	.11	.55
Explanation File	70	43	48	65	47	.18	.28
N	25	33	24	19	101		

Source: Post-Use Questionnaire

The User Consultants

The user consultants are volunteers who receive accounts and TELENET time in exchange for playing multiple roles in serving as go-betweens for the system and its users. They supplement the printed and on-line documentation in helping both new and advanced users to learn how to use various parts of the system. They provide a human source of support and encouragement and serve as peoplebrokers in assisting users in finding others interested in the same topics. In addition, the user consultants test new features and actually write the documentation for them; these functions are generally not visible to other EIES members.

The user consultants are very popular. As pointed out in Chapter Four, in the post-use checklist of the usefulness of various EIES features or capabilities, they are ranked near the top at all levels of experience. In addition, there was a question on the follow-up questionnaire that provided for open-ended comments about user consultants. The question read as follows:

Have you ever asked a user consultant for help?

No

Yes (Please describe whether this was helpful, satisfactory, courteous, or whatever.)

Unfortunately, the question was biased toward a positive response. Most users asked at the follow-up point did report contact with a user consultant (82 of 108 responding answered "yes"). Of these 82, 67 made favorable comments--but most took the easy way out of simply circling one or more of the adjectives, such as "helpful," "satisfactory," or "courteous." Those who wrote something in their own words are quoted in Table 5-5. Though there are a few cases of nonresponses from the user consultants or of mixed opinions about their helpfulness, most of the comments are quite enthusiastic.

Table 5-5

Comments about the User Consultants

"Excellent and friendly"

"Prompt!"

"Great"

"Very useful"

"Very prompt and useful"

"Very satisfactory, very courteous, very enjoyable!!!"

"Unavailable in most cases"

"Not too helpful--merely repeated what I already knew"

"Fantastic!"

"Couldn't get through"

"Helpful, mildly courteous. When I asked one how to add people to my conference, he answered that starting a conference was a big deal and was I sure I could handle that?!?"

"Some consultants were helpful; others were not."

"Nice people"

"It was useful."

"OK--answered question"

"Courteous, prompt, usually but not always"

"They're great--you know that!"

"Very helpful, quite courteous. They are essential."

"9 times out of 10 the response is prompt, helpful, courteous, and friendly. Occasionally a request seems to be ignored."

"Yes--but--a bit more 'kindergarten' approach needed"

"Very helpful, satisfactory, and courteous. I am very impressed by the services provided by these people."

"They were helpful and courteous and answered my question quickly."

Table 5-5, cont.

"Yes, very helpful and friendly"

"Courteous but unhelpful. 'Yes we have had a lot of trouble with IBM terminals. Good luck.'"

"Very helpful. Often my question was in search of information that was not really available."

SYSTEM INTERFACE

By "system interface" we mean the way in which the user and the system talk to each other-- the nature and style of the interface, the editor, etc. As mentioned in an earlier chapter, EIES has five alternative levels of interface: long menu, short menu, answer ahead, commands, and self-defined commands. However, beneath each of these levels lies the same basic structure of prompts, error messages, and editing capabilities.

We used the term "system language" to refer to the style of the user interface, the way it responds to user actions. This receives generally favorable user ratings. On a five-point scale in which one signifies "understandable" and five "confusing," 42% rate it one, 40% two, 13%, three (the neutral point), and only a handful negative. On a scale from "courteous" to "inhuman," results are almost identical. 40% give it the highest rating, 38% a two, 15% a three. Neither of these variables is significantly related to time on line. In fact, exactly the same proportion of the newest users who answered the questions give the language of the EIES interface the highest rating as do total EIES users.

On the other hand, there is a strong, significant relationship with group membership. The negative ratings occur in the groups that are most disgruntled and dissatisfied with EIES as a whole, and least "successful" by other measures (Groups 50 and 54: see Table 5-6).

The editor does not fare so well. Though the majority of persons give it satisfactory ratings, a small but substantial proportion dislike it very much and rate it among the most unsatisfactory things about EIES. In terms of being "easy to remember" or "hard to remember," 32% rate the direct edit symbols (such as /old/new/) as one, or "completely easy to remember," 16% as two, 21% as three ("neutral, neither easy nor hard"), 10% as four, and 10% as five, or "hard." This is weakly related to time on line (gamma = .36, p = .11). It is significantly related to group (Table 5-5).

In terms of being "easy to use" or "hard to use," the direct edits receive similar but slightly more favorable ratings (37% = one, 34% = two, 15% = three, 7% = four, 7% = five). There is, once again, a weak, not statistically significant relationship with accumulated hours on line.

Indirect editing commands control text formatting on output, rather than being used for correcting mistakes. For example, the command .tabs is used to set up columns in tables, and the command .text, rjust is used to format text so that it skips lines between paragraphs and fills text from margin to margin on the receiving terminal, regardless of how the text is typed in, and right justifies or lines up the right margin as well as the left. The indirect editing commands caused the most confusion. In terms of ratings, 17% rate them as one on a scale where one equals "good" and five equals "poor;" 17% give them a two, 39% a three, 10% a four, and 15% a five, or "poor." There is no relationship with time on line.

The user consultant file contains many questions from members asking about how to use the family of commands under ".text" that control such things as indentations, margins, skipping between paragraphs, and spacing. These were not included in the original written documentation because they were developed during the operational trials. Even though a few of the members of EIES put the text editor on their list of the most valuable features, more put it on their list of nominees for "worst feature." These comments and the group membership of those who made them help to pinpoint the nature of the dissatisfaction. The EIES editor is a line-oriented editor meant for those working on a terminal printing at 30 characters per second. Anyone who is used to working on a direct-wired CRT at a high baud rate finds it most slow and clumsy. Though most EIES users do not fit into the latter category and many of those who are used to high speed CRT's now have their own micros with built-in editors, a possible improvement tc EIES would be to make an alternative editor available to those who are working on CRT's.

Table 5-6

Is the Language of the EIES System Understandable, by Group

Group	1 (Understandable)	2	3	4-5 (Confusing)	N Responding
30	40%	40%	20%	0%	20
35	48%	40%	12%	0%	25
40	41%	48%	3%	7%	29
45	52%	33%	14%	0%	21
50	20%	20%	40%	20%	5
54	13%	38%	12%	38%	8
Total	42%	40%	13%	5%	108

Source: Follow-Up Questionnaire

Chi square = 38.6, p = .01

Table 5-7

Are the Direct Edit Symbols Easy to Remember or Hard to Remember, by Group

Group	1 Easy	2	3	4	5 Hard	N Responding
30	32%	23%	18%	14%	14%	22
35	44%	26%	17%	4%	9%	23
40	29%	36%	25%	11%	0%	28
45	45%	20%	20%	15%	0%	20
50	0%	40%	0%	20%	40%	5
54	0%	12%	38%	0%	50%	8
Total	32%	26%	21%	10%	10%	106

Source: Follow-Up Questionnaire

Chi square = 35.4, p = .02

Provision of a Variety of Interfaces

A design decision was made to provide a variety of alternative interfaces. The theory was that they would form a kind of progression, with most users starting out with the long menu, which requires no knowledge of the system and no memory of its structure whatsoever, and progress to the short menu; from there they would begin utilizing answer aheads and commands and, finally, frequently use their own defined commands or strings of operations.

The data show that there is such a pattern. However, they also show that there is a great deal of individual variation in interface preferences and patterns of use. Although it is true that the long menu is the preferred interface for new users and becomes less frequently used the more experience a person has, its use never stops altogether. Among those with 50 or more cumulative hours on line, 41% report that they "sometimes" use the long menu. Apparently, they turn it on when they use new or unfamiliar parts of the system or when they have been away from the system for a while and need to have their memories refreshed. (This figure does not appear in Table 5-8, which shows only the frequency of the "frequently" and "often" responses.) Thus, though there is a tendency for the predicted progression pattern, one cannot automatically change the interface at a certain point in time. After experience is gained, commands are the most frequently used interface, but the others are used either habitually or from time to time by a large proportion of the system's members.

User Support for Learning Menus First

Users who have previously used command-driven systems are sometimes impatient with the menu as an introductory interface. However, the majority of users support the design decision to teach menus first (Table 5-9). Using the menu seems to have the cognitive effect of helping the user to develop a mental map of the structure of the system. When the user understands the sturcture of the different parts of the system and the relationship among them, the more active command mode can be used to move around the system at will. Support of the menu as a beginning interface grows stronger the more time a person spends on line.

Forced Delivery of Messages

A somewhat more controversial aspect of the EIES design is that, although users may postpone delivery of messages, such undelivered messages will remain in the queue, and the user will be frequently notified of their pending status until they are accepted. Some users wish to be able to reject the delivery of messages without printing them out, perhaps on the basis of author or keys. Forced delivery is not made of items in conferences or notebooks, where members are free to read a header only, the full text, or nothing.

The designer's point of view is that confidence that a message sent will actually be delivered is more important than the temporary inconvenience of a recipient. Furthermore, it is argued that, if a person is sending overly wordy or irrelevant messages, other group members should let him or her know, rather than surreptitiously refuse delivery of further messages from the person. A particularly sticky design argument is what to do about confirmations if rejection of messages were indeed permitted. Since delivery of all messages is normally confirmed, should a comparable notice of a rejection of a message be returned to an author?

In looking over suggestions from users in the user consultant file, the most popular design alternatives suggested are either making acceptance of group messages (but not of private messages) optional, in which case authors could at any point check a confirmation list if they want to know who has actually read a message, or allowing rejection of any message with some sort of notification. For all users, the modal preference is support of the current design, with forced (eventual) acceptance of all messages. This is endorsed by half the members responding overall, and the support of the design decision increased with experience (see Table 5-10). The second most popular option, endorsed by a quarter of users, is to allow rejection of any message, with some sort of notification to an author available. Many people suggest some kinder term than "rejected" or "refused," such as "NAME has been notified of pending M###." And about 4% suggest some other alternative altogether. Thus, there is no one solution to this problem that will satisfy everyone, but the forced delivery of at least private messages is generally endorsed.

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Table 5-8

Use of Alternative Interfaces, by Time on Line: Percentage Using Interface "Frequently" or "Often"

	Hours on Line				
	<20	20-49	50-99	100+	All
Long menu	45%	36%	0	0	33%
Short menu	41%	40%	69%	50%	44%
Answer ahead	20%	44%	58%	75%	39%
Commands	34%	71%	74%	75%	48%
String Variables	0	3%	43%	25%	10%
N responding	41	35	12	8	96

Source: Follow-Up Questionnaires

Table 5-9

Preference for Teaching of Menus or Commands First, by Time on Line

	Menus First	Commands First	Other	N
5-19 hours	52%	38%	10%	29
20-49 hours	74%	22%	11%	29
50-99 hours	83%	8%	8%	12
100+ hours	88%	12%	0%	8
Total	70%	24%	6%	78

Source: Follow-Up Questionnaire
Question: Do you now think it is a good idea or a poor idea to introduce the new user to the system through menus and to provide equivalent commands for those who prefer them?

Table 5-10

Percentage of Users Favoring the Requirement that All Messages Must Be Accepted by Addressees, by Time on Line

Cumulative Hours	%
<20 hours	43%
20-49 hours	51%
50-99 hours	58%
100+ hours	71%
All	50%

N = 103

Source: Follow-Up Questionnaire
Question: In EIES, you do not have the choice of permanently refusing to accept a private or group message. Which of the following would you prefer?

Require acceptance of all messages, as at present.
Require acceptance of private messages only.
Allow rejection of any message, with "message refused by ###" returned to the sender. Comments?

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DEALING WITH THE PAPER MONSTER

The massive amounts of paper generated by a medium that is supposed to be the precusor of a "paperless society" is the subject of much joking and of genuine distress. In the public conference on "Impacts," for instance, there are mentions of having to buy more and larger waste baskets and of taking out the garbage more frequently. The long rolls of thermal paper on the portable terminals provided to many users are especially difficult to store, since they are not perforated and do not easily fold or divide into pages.

As shown in Table 5-11, users vary in how they handle their printouts. Some develop complex indexing and filing systems, complete with color coding. A few go so far as to keep written logs of all messages sent, dates of confirmations, etc. Only a few throw away the printouts. The modal method is to establish categories by conference or group number and to file hard copies within these categories, thus simplifying retrieval and review.

Table 5-11

Disposition of Printouts, by Group

	30	35	40	45	54	Total
Throw all out	0%	8%	0%	0%	13%	4%
Keep them all	9%	32%	10%	24%	-	18%
Save selective entries in single file	32%	12%	31%	19%	25%	23%
Save selective entries in separate files	32%	28%	45%	38%	25%	34%
Use a CRT	4%	12%	7%	14%	38%	15%
Other	23%	8%	7%	14%	38%	15%
Total responding	22	25	29	21	8	109

Chi square = 34.3, p = .10

(4 group 50 responses omitted from above)

Source: First Follow up

Question: "What do you do with the printouts of material from EIES?"

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LIKED AND DISLIKED FEATURES OF THE SYSTEM

The post-use questionnaire included several open-ended questions on those aspects of the system that are considered to be most valuable and useful vs. those most useless, distracting, or in need of improvement.

EIES Favorites

Table 5-12 shows the complete list of answers evoked by the open-ended question on the "most valuable features of EIES." There was no obvious pattern of variation by group, so the answers have been rearranged into rough categories.

Note that many members do not mention specific features at all, as was anticipated, but, rather, general characteristics and advantages of the medium, such as the fact that users "self-organize" information and that the user experiences the intellectual stimulation of a wide range of contacts. Among those who name specific features as the most valuable aspect of EIES, messages and conferences are most frequently singled out, but text editing and joint notebooks are also frequent nominees for "Best Feature." In addition, many relatively "minor" aspects of the design are singled out as somebody's very favorite feature, such as "+link" (real-time interchange of single lines of text), the "Paper Fair," the multiple interfaces, the directory, and even the short but friendly "Welcome" that is the way the EIES computer responds when first dialed. This diversity underscores the conclusion reached in the analysis of "The

Evolution of User Behavior" that there is no single design based on a small number of features that will satisfy the experienced, sophisticated user. Users begin to be gourmets, appreciating the subtleties of the choices and variations that can be selected from according to preference.

A third group of responses focuses neither on general medium characteristics nor on specific features but, rather, on specific kinds of benefits derived from using EIES. This includes decreased need to travel, the opportunity to interact with well-known scholars (the graduate student who wrote this noted that such collegial contact with well-known scholars at other institutions would not otherwise have been possible), and the ability to obtain such things as annotated bibliographies of recently published material, contributed by the members of a group.

TABLE 5-12

A LIST OF THE MOST VALUABLE FEATURES OF EIES (PARAPHRASES OF RESPONSES TO AN OPEN-ENDED QUERY: POST-USE QUESTIONNAIRE)

1. I especially liked the immediacy of communication and the diversity of discussions in which I could participate actively or passively. It was fun and intellectually stimulating to be part of EIES.

2. The asynchronous mode of communication is the most valuable feature; it allows both for delayed responses and for the delivery of messages whenever and as soon as the addressee returns to his/her terminal.

3. Group conferences: The sharing of ideas is valuable.

4. There are many levels of interface.

5. EIES is really designed for humans! One does feel free on EIES, not constrained by the computer. It allows the user to utilize "natural" information processes and strategies. Getting information from people is pleasant and efficient. Information is not preorganized, like in data bases; it is "self-organized" by the users.

6. The directory and the search/retrieval processes are, in general, quite informative and easy to use. (And the "Welcome" header for new members is great as a first introduction to the people using the system.)

7. I feel no pressure to say anything in conferences. I've learned more by listening more.

8. Getting annotated reading suggestions is a great learning tool.

9. The speed of communication is a big plus.

10. The command that types out all the messages that you haven't seen yet is a great convenience. (Note: This user had not been active for some time. I think that +GWCI, get waiting conference items, is what was meant.)

11. The communication involved makes one able to keep aware of what some other people, even though far away in some cases, are doing or thinking.

12. One can interact, in general, without the customary hindrances or inhibitions.

Table 5-12, Cont.

13. There is availability of the entire history of a conference. Messages can also be private, and the personal message exchange is very useful.

14. There is also the ability to send group messages.

15. The search for items WOULD be very useful if it worked.

16. The focus is academic, yet diverse.

17. There are also devices to send instantaneous private messages and to participate simultaneously in group conferences.

18. One can quickly tap both special and varied information.

19. One gets a real feeling of living in a network society.

20. There are many time-saving system commands to do things directly.

21. The idea and potential for research is fantastic. The budget constraints caused problems, though.

22. There are many editing features built intrinsically into the system.

23. I was able to interact with some well-known scholars (and with the advantage of instant interchange!)

24. One can update listings of professional activities anytime.

25. I especially liked the new "paper section," c1017.

26. It's like having a post box (messages).

27. There are a large number of interesting and active people; there is always mail or a new conference item of some interest.

28. It is very easy to sign off.

29. There is the ability to reach anyone on the entire EIES system.

30. The system facilitates sharing in the construction of bibliographies.

Table 5-12, Cont.

31. There is receiver-specified formatting of text (according to receiver's terminal specifications).

32. There is Group 45 (Vocational Rehabilitation of the Disabled)!

33. There are joint notebooks for coauthoring and coediting.

34. The Chinese menu is useful at the beginning.

35. One can conduct and monitor an evaluation of a technical aid with multiple groups.

36. One is left with hard-copy messages that can be stored for later use.

37. One has quicker, more universal correspondence capabilities than one has with the paper mail or over the phone; one can even tap many minds at one time.

38. The immediacy of communication, combined with selected working-group interaction and the traceability of idea-development-discussion-revision, etc., is unique. I have also learned to type from using the terminal.

39. There is no need to travel. I also got to interact with some new people and to watch other new people interact.

Complaints about Specific Features

The opposite of the "Most Valuable Feature" awards is brought to light when one inquires as to those aspects of the system that are felt to be most useless or distracting; they are shown in Table 5-13, arranged by specialty group. More than one comment under the same number means that it came from the same respondent. Note that the length of the complaint lists and the specific nature of the suggested improvements vary markedly by group. Groups 30 and 45 have very few members who list anything as useless or distracting. On the other hand, Groups 40 and 54 (especially relative to the small number of post-use returns from group 54) have many nominees for "Worst Feature."

Group 35 has several complaints about the quality of the content of the communications contributed by its own members ("junk messages," "off-the-wall comments," "making cute remarks"). Similarly, group 40 is marked by the number of complaints about group messages that are voluminous, unnecessary, or of little general interest. This group had the largest number of "Season's Greetings" consisting of graphics and text exchanged as group messages. Apparently, some of the members definitely did not appreciate this particular form of electronic art used as social amenity, particularly if they were off line during the holiday season and had to sit through a dozen or so Christmas trees printing out in February. As they themselves suggest, one solution would be that group messages should have a self-destruct date. That is, when they are entered, the sender should be asked the last date on which the message should be delivered, since most group messages refer to subjects of interest for only a limited time.

Subsequently, features were developed on EIES to allow users to send a short group message that contains embedded within it a much lengthier discussion for those who are interested in reading it. (There are actually two methods for doing this, one suited for one page of material, the other for making many pages available on request). Currently, observation shows many fewer group messages being sent and the frequent use of the mechanism of making a short announcement followed by material that does not print unless selected by the recipient.

Group 54 is the only group with complaints about the basic system design. Part of the explanation is probably that many of these group members were used to working on very sophisticated, high-baud-rate systems at their own universities. They should probably not have used EIES at a low baud rate but, rather, should have used micros as terminals so that they could edit with a familiar editor and scan material at the high baud rate to which they were accustomed.

However, there is probably also the effect of an insufficient level and frequency of use to maintain facility with the system. As Bair (1979, in Uhlig, Farber, and Bair) points out, unless people use a system at least every few days they keep forgetting what they learned, and the system always seems difficult and arbitrary. Group 54 never got any successful conference or activity going on line, with the exception of a period after Three Mile Island when the nuclear accident inspired in their group conference considerable

Suggested Improvements

Improved documentation, including interactive lessons on line, is one of the most frequently mentioned areas for improvement in the EIES system. Among the other frequently requested improvements are better graphics and better text editing. Substantial improvements in this area would require improvements in the quality of the terminals used by members: that is, as long as the standard or most usual terminal is a 30 c.p.s. portable printing dots on scrolls of narrow paper, one is not going to be able to use sophisticated graphics or editing routines. Mathematical symbols, as also superscripting and subscripting, are also terminal dependent.

Many other suggested improvements show considerable understanding and insight by the users as to what can be put into the central system. A frequent category of suggested improvement is in the "information overload" area, from general requests for faster and easier ways to skip the printing of uninteresting-looking portions of conferences or documents to specific ideas for how to do this. For example, one member suggests the addition of the choice "T" (for titles only) to the "accept messages" question, which now allows only the options of "yes," "no," or the first N messages.

Another suggestion that falls in this area is the provision of a high-speed printing service so that large amounts of waiting items could be printed at the central facility and mailed, rather than printed locally at 30 c.p.s. Such a high-speed printer had been requested in the project budget but was eliminated by NSF as an unnecessary luxury! At the end of the operational trials, as a result of such requests, a high-speed printer was purchased from other funds.

Another frequently mentioned area for improvement is in response time, particularly for special routines (not written in hard code). This is dependent on acquisition of a newer, larger machine.

Table 5-13

Useless, Distracting, or Out-of-Place EIES Features

Group 30

1. Bugs and delays--which are inevitable in the developmental phases of any system

2. Frivolous stuff--games

3. All the preliminary garbage before I can get into the scratchpad

4. More than one line, and faster response, for "+sen"

Group 35

5. The menu (but I assume there's a way to short circuit this)

6. Terminal errors in the midst of long printouts make it virtually impossible ever to read the END of a document. Suggest some form of scanning mechanism to allow one to skip over previously seen material.

7. Any instructions or printed diagrams should distinguish between what is capable (upon the system) and what isn't. Too many hours are spent trying to figure out how to work something that isn't there.

8. Junk messages

9. Off-the-wall comments in conferences

10. Pen names

11. Making cute remarks and funny games

12. The editing is junk.

13. Forced reception--slow response

Group 40

14. The introduction is too long.

Stuff at end of message--I would like to be able to shortcut it.

List of names in conference should be a conference choice, not a step by itself. I rarely use it.

15. System commands

People use group messages when they should send private messages to the few who are interested. (Not the system's fault, I suppose.)

Table 5-13, Cont.

16. There should be a maximum time for the life of each undelivered message. It should self-destruct after a while.

17. Compulsory reception of messages, group messages in particular, is a drawback.

The same goes for conference comments. It should be made easier to skip a CC and go on to the next. This is possible by SCM but very awkward and so in fact not a practical option.

18. The newsletter is too specialized and too frequently advertised.

19. Chit-chat

20. Group messages

21. The volume of text to be read. Editing.

22. Too much paper pours out. If I can afford it I will get a CRT and print only selectively.

23. Certain undesired group messages, large "Merry Christmas" greetings, etc. (junk mail)

24. Sometimes the extraneous group messages are a pain.

25. Too many group messages

26. Have to wade through too much useless material

27. Group messages that are not really of general interest (e.g., "Merry Christmas" notes)

28. I/O is slow and difficult (for me).

29. Difficulty of keeping track of last item I saw in a conference

Not being able to respond to messages or conference items right away, just after they are displayed, without some commands

Burden on memory of too many cues, e.g., 2, 4, cnc, cnm, etc.

Slowness of system, especially in composing messages

Lots of the messages and comments are insignificant.

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Table 5-13, cont.

Group 45

30. Allowing all users access to all other users--i.e., it would be nice to be able to disallow message sending at will.

Overall, we get many "complaints" that the system is too difficult to learn (a better manual, in particular, is needed) and that it can be very slow.

31. Delay at CR

Group 54

32. The terminal, phone patch, etc. really gets in the way with this system. And the system architecture, formats, and input-output routines are not as easy to learn and remember as they could be. When the basic system structure is completed and it all works OK you'll have to go back and work on streamlining all these things.

I want to emphasize how long and awkward the system learning process seems to noncomputer users. Also, in our fast-paced world the learned operations and procedures seem arbitrary and are easily-quickly forgotten from one week to the next. Revision of the Red Book to streamline and provide ALWAYS handy, ready reference would be worthwile.

33. Graphics. Long lags in time sharing. Poor editing.

34. I am afraid I found EIES to be awkward and backward. This is in comparison to other systems of teleconferencing (e.g., FORUM) I have used.

Specifically

A. EIES is very slow.

b. Too many arbitrary symbols to know

c. Impenetrable interface to other systems

d. Inability to accept files in computer compatible form (tapes, etc.)

e. Poor documentation

Table 5-14

SUGGESTED IMPROVEMENTS

Post-Use Responses to the Question,
"What general improvements/new features/changes would you like to suggest for EIES?"

1. Easier ways to skip over unwanted text or uninteresting portions of text

2. Graphics very tough now

3. More reliable system

4. Faster, less cumbersome text editing

5. Better/easier ways to organize, string together, or have group-related comments

6. Improved graphics capabilities

7. Summary message header list (i.e., when one is asked if one wishes to accept a set of waiting messages, one could answer "T" for titles only, or "H")

8. Interactive tutorial for learning advanced features

Would have helped a lot if interactive programs, e.g., simulated interviews, had run more quickly.

9. High-speed printing. Hashed item searches.

10. Ability to retrieve data from other facilities

11. Easier ways to skip over unwanted text or uninteresting portions of text

Better graphics and mathematical symbols

12. +vacation. This would allow you to define a message, explaining that you were on vacation (or out of town on business, or whatever), including dates, etc. Anytime someone sent you a message, your explanation would be sent to them automatically, then they'd know why you weren't answering urgent communications!

13. Simplify to bare essentials; replace with long-distance telephones

14. Either increased computational ability or increased data access to other systems

15. Some data analytic capability

Table 5-14, cont.

16. Fewer limitations on length of messages, better way of handling (i.e., faster) line overflow

17. Math symbols

18. Multiple reference numbers referring to past messages. Enter conferences in the directory. Require announcements when conferences are opened.

19. Superscripting, subscripting. Better editing.

20. Text editing and message-composing treatments are so inadequate and difficult to learn. Documentation inadequate. Need "primer," better reference manual.

Provide option for large volume of output to be mailed.

21. Bibliographic reference files with key words, etc.

22. I would like to see a matrix of who talks to whom available each month, like timestat.

I would like to be able to order a set of printouts and have them mailed to me.

23. An MIT professor recently visited and noted that EIES cannot be taken seriously until it gets a better editor. The designer should look at the DEC 20, RT-11, or other good editors for ideas. Specifically, the automatic renumbering of lines needs to be done away with.

24. Longer hours of the day

25. Improve the facility to search messages or CC's by author, keyword, or date.

GET OFFLINE PRINTING! so I could get a print of selected cc's, etc. Forcing all information through the 30 cps bottleneck is currently an irritation and an inhibitor of participation.

Sometimes response times on EIES seem quite slow. I would rather be told "EIES is full, try later" and then get fast service when I DID get on than be a participant in a sluggish system slowed down by too many users.

26. I would like to see tutorials, workshops, or lectures on EIES.

27. Some kind of quality monitoring

28. A way of accessing text via abstracts

29. Some sort of information filter--e.g., more summaries, with details available if wished

Other Evaluative Comments

For the sake of completeness, responses to the final open-ended question included in the post-use questionnaire are shown in Table 5-15. These are a mixed bag, though mostly on the positive side.

There are some qualitative measures of subjective satisfaction that, with hindsight, it would have been good to research systematically. One is that several members of the system were so enthusiastic about it that they wrote professional papers on it and otherwise engaged in proselytizing efforts. About a half dozen of these have been received; if a question had been included on the post-use instrument, more might have been turned up.

Table 5-15

Other Reactions to EIES

(Question: "Any other comments on the EIES system or its impacts?")

1. I was terminated just at the time when I was beginning to realize the potential benefits of participation on the system. A year isn't time enough if you are holding down a fulltime job and all sorts of other committments--unless you have a nice block of released time. Thus, I've ended my use with an intense feeling of frustration--but I'm not sorry I participated, nevertheless.

2. EIES attracts its own "nuts;" also addictive like drugs.

3. If EIES ever gets another grant that would allow me to rejoin it, I would be very interested. I think it is a marvelous aid to stimulate thinking, compare theoretical conclusions, etc.

4. The system was not as useful, for me, as it might have been solely as a result of the participants and the types of things communicated. There seems to be a natural tendency for the discussion to degenerate to trivially abstract issues so that the best persons in network analysis gradually stopped signing on. If there is any one main problem, it is the lack of social constraint face-to-face interaction puts on the exchange of trivial items in professional discussions.

5. Face-to-face meetings--which probably would not have occurred without EIES--have helped to generate a sense of belonging to a (sub)community.

6. A more coherent research specialty group would benefit more from EIES. It would also be useful if EIES were available at every university for conferences, to be shared by researchers in many disciplines.

7. I respond to EIES requests in days, whereas I respond to mail requests in months. (Why?)

I write a lot to EIES, but almost never write letters.

8. I LIKE EIES despite my grouchiness about the apparent unwillingness to provide offline printing. It is imperfect but a friendly first attempt at a usable computer conference center. The consultants are very helpful. I wish I had time to explore more of the conferences on the system, for I know there is a lot going on that I have only glimpsed.

9. I think that it is important to have high quality (scientifically speaking) participants. Most of what I saw was worse than second rate.

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Table 5-15, cont.

10. I enjoy it after overcoming several difficulties. It is DIFFERENT and therefore not so easily comparable with traditional modes of communication. It has ITS OWN style and way of exchanging information that is likely to grow rather than replace others.

I will miss it when the project is terminated and I might not be able to afford the costs of participation on my own.

11. EIES is like marriage--can't stand it but need it.

12. I wish EIES were more "service oriented," with cheap, rapid distribution of materials by mail (printouts as microfice perhaps?) Clones updating each other at acceptable transmission rates would be ideal. Biggest threat to its future will be legal, political issues.

13. I think EIES is great. I would like to participate more, and I feel it has a great future.

14. Given funds, the most important decision an individual has to make is how best to use his/her TIME. I have found that the EIES experience is an extremely valuable learning exercise, but then I have much to learn.

15. EIES has forced me to truly appreciate changing technological shifts and how to "cope" in a positive manner.

16. The review of communications xeroxed and distributed by Umpleby (group leader) was very useful. That kind of review should probably be done quarterly so that those not using the system much could catch up and not feel quite so reluctant to reenter the communications.

17. In general, I have been very pleased with EIES as a communication medium. I have been unable, due to the difficulties of gaining access to a terminal on a regular basis, to spend as much time on the system as I would have liked to. In my time on EIES, I have been pleased with some of the people on the system but have generally found most of the comments and interactions to be worthy of little more than passing interest. What has been very profitable has been the use of private conferences for getting something practical done.

18. Keep EIES whatever the cost!

19. Once you have established a link, attention for a problem is very good, but the problem is to get through, to get attention for a specific question. A lot of things get drowned in the flood of information.

20. I am proud to have been a part of it.

21. We need a full-time group member on the system to set up structures that other members need but lack the time to initiate.

Table 5-15, cont.

22. I have truly enjoyed and benefited from it but have not gotten to use it in the past several months because of travel time to Newark. In order to be of maximum benefit, it must be on-site. To travel a distance, even 10 minutes, reduces one's abilities to utilize the system.

23. A problem with its use for some purposes is the limited number of participants who are on line.

24. The electronic journal experiment has been very disappointing in practice. The quality of EIES has, in this case, turned off all users. Our evaluation (and other peoples' too) in a "volunteer use" situation is not a good test. If my institution or my profession made it de rigueur to use EIES, I would use it and enjoy it. The trouble is that the affairs of my and others' professional lives are conducted via another medium. Thus, the EIES experience is not "real," and there is little motivation for people to utilize it.

25. This system needs to be tailored to particular kinds of interactions on specific kinds of topics. The payoffs may come through exchanges of factual information on how to do an experiment, for instance. We know what kinds of information are exchanged by phone, letter, presentation, journal article, and book, for instance. However, we have no expectations involving this mode, and, to be effective, such expectations should be formally declared at the outset, kind of like an up-front contract.

OVERALL REACTIONS TO EIES

One measure of satisfaction with the EIES experience lies in the feeling by participants that they received benefits at least equal to the effort expended. The majority of participants, as shown in Table 5-16, do feel that they received as much or more than they contributed to their group(s). The most active participants (100 or more hours on line) are most likely to perceive a balance between their contributions and the amount and quality of information received as a result of contributions by others. Somewhat surprisingly, participants at the lowest levels of activity, who in fact are most likely to receive much more than they type into the system, do not always perceive this to be the case, and, at intermediate levels of use (50-99 hours on line by the end of the trials), there is the greatest probability that participants will feel that they are contributing more than they are receiving in return.

Responsiveness to Messages

Another overall measure of satisfaction with this form of information exchange results from the perception of the responsiveness of others to the messages they receive. We once again see a somewhat curvilinear relationship to amount of time on line, with intermediate-level users forming the highest proportion of those feeling that people are less responsive to EIES messages than they are to mail or to phone calls. None of the most active participants feel that others are less responsive to electronic messages than to other forms of communication. This is an interesting perception, since many of the persons to whom they send messages must be on line much less frequently than they themselves are.

Experiences while Communicating over EIES

Table 5-17 shows the frequency with which users report various experiences or feelings while using EIES. For example, the frequency with which one feels distracted by the mechanics of the system intruding upon the flow is related to group membership. There is a tendency for this feeling to decrease with more time on line, but the relationship is not statistically significant (gamma = .17, p = .24).

For feeling "overloaded with information", "sometimes" is the modal answer. The frequency of feeling an overload appears to peak in the middle ranges of use; 31% of those who had logged 20-49 hours on line report "almost always" experiencing information overload, whereas all of those who have logged 100 hours or more report the overload experience to occur only "sometimes." Being able to express your views is generally reported to occur "almost always;" among those with 50 hours or more on line, the responses are all in the "always" or "almost always" category (the correlation with hours on line as measured by gamma is -.20, significant at the .05 level).

In terms of feeling "constrained in the types of contributions you could make," "sometimes" is also the modal answer. Finally, being "able to get an impression of personal contact with other participants" tends to occur "sometimes" for those with less than 50 hours on line and "always" or "almost always" for those with more than 50 hours on line (correlation with hours on line, as measured by gamma, is -.47, significant at the .02 level).

Table 5-16

Some Impressions of EIES, by Time on Line

A. Balance between Contributions Made and Information Received

	Contributed Sig. More	Contributed More	Equal	Received More	Received Sig. More	N
1-19	4%	7	37	37	15	27
20-49	6%	9	36	21	27	33
50-99	12%	28	28	12	20	25
100+	0	10	58	16	16	19
All	6%	14	38	22	20	104

Source: Post-Use Questionnaire
Chi square = 16.5, p = .17, gamma = .14

Question: Comparing my contributions or effort put into EIES with the amount of information received, I feel that I have: contributed significantly more than I have received, contributed more than I have received, contributed as much as I have received (equal), received more. received significantly more than I have contributed.

B. Relative Responsiveness to EIES Messages

	More Responsive	Less Responsive	No Difference	Total	N
<5 hours	40%	0%	60%	100%	5
5-9 hours	26%	38%	36%	100%	42
20-49 hours	49%	23%	29%	100%	35
50-99 hours	33%	17%	50%	100%	12
100+ hours	72%	0%	28%	100%	7

Chi square = 25.894, p = .0967

Source: Follow-Up Questionnaire
Question: When you send a message over EIES rather than writing or telephoning, would you say that recipients are generally: More responsive to an EIES message? Less responsive? Equally responsive (no difference)?

Table 5-17

Experiences while Communicating via EIES

(Question: Thinking back over your experiences with the system, how frequently have you felt...)

	Always (1)	Almost Always (2)	Some-times (3)	Almost Never (4)	Never (5)	Mean
Distracted by the mechanics of the system	5%	16%	49%	23%	7%	3.1
Constrained in the types of contributions you could make	4%	17%	44%	28%	8%	3.2
Overloaded with information	4%	18%	55%	16%	6%	3.0
Able to express your views	24%	47%	24%	5%	0	2.1
Able to get an impression of personal contact with other participants	8%	35%	46%	6%	5%	2.6

Source: EIES Follow-Up Questionnaire, N = 110

SUBJECTIVE SATISFACTION SCALES

Overall ratings of EIES as a communication-information system tend to be fairly positive, but not "perfect," in terms of users' subjective responses to a number of scales designed to measure satisfaction. Subjective reactions are, needless to say, highly correlated with total amount of use of the system.

Table 5-18 shows that users tend to rate the system as good overall by the time of the three-month follow-up and also as stimulating rather than boring, productive, fun, friendly, and easy to use. There are three dimensions on which a quarter to a third of the respondents give a negative rating: that the system seems to be frustrating at times, time wasting, and intrusive.

These subjective satisfaction scales are the most general assessments of EIES that we have. They will be used as the basis for a more detailed analysis of subjective satisfaction factors and their determinants, which will be presented at the end of the chapter.

The DACOM scales, designed originally by the Communications Studies Group in Great Britain, have been used to measure users' perceptions of a variety of systems and media. Chapter Eight will present some of the comparative data available. For this study, scales were administered both at follow-up and at post-use. There were very high correlations between the measures at the two points in time. The post-use data were chosen for Table 5-19, since the follow-up measures have been presented in interim reports. EIES is seen as most satisfactory for emotionally neutral task-oriented functions: giving or receiving information, exchanging opinions, generating ideas, giving or receiving orders. It is also seen as satisfactory by most people for social-emotional tasks such as getting to know someone and expressing positive and negative emotions. It is perceived as least satisfactory for functions related to conflict and negotiation: problem solving, bargaining, persuasion, resolving disagreements. For these last tasks, the ratings cluster in the neutral (3-5) range rather than in the positive (1-3) range characteristic for other functions.

Two groups using the system (JEDEC and a medical standards group called MRFIT) reported that a characteristic mode of communication mix was to use the system for routine communication and to resort to other modes, such as face-to-face meetings or the telephone, when conflict arose. Whether special structures can be incorporated into computerized conferencing systems to support conflict resolution is a research question that is now being pursued. Without such special structures, it is evident that user groups find the medium lacking for conflict resolution tasks.

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Table 5-18

Overall Reactions to the EIES Mode of Communication

	1	2	3	4	5	6	7		Mean
Extreme- bad	12%	78%	30%	3%	10%	4%	0	Extremely ly good	2.8
Boring lating	20%	37%	27%	7%	8%	1%	0	Stimu-	2.5
Productive	6%	22%	36%	16%	14%	4%	3%	Unproductive	3.3
Unpleasant fun	15%	36%	22%	14%	12%	1%	0	Great work	2.7
Time saving	10%	15%	19%	24%	22%	6%	4%	Time wasting	3.7
frus- ing	8%	11%	22%	22%	23%	9%	4%	Not Frustrat- trating	3.9
Friendly	16%	42%	28%	14%	6%	3%	0	Impersonal	2.7
Difficult	16%	28%	22%	18%	13%	3%	0	Easy	2.9
demand- ing or intrusive	14%	16%	20%	22%	24%	3%	1%	Not Very demand- ing or intrusive	3.4

Source: Long follow-ups, N = 111

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Table 5-19
CSG DACOM Scales:
Extent to Which EIES Is Satisfactory for Various Communications Tasks

	Completely Satisfactory						Completely Unsatisfactory			
	1	2	3	4	5	6	7	Means	Gamma	p*
Giving or receiving information	25%	41	14	10	7	4	0	2.4	.17	.70
Problem Solving	3%	15	19	28	23	7	4	3.9	.15	.22
Bargaining	6%	9	16	30	20	9	9	4.1	.16	.65
Generating ideas	15%	30	33	11	7	1	3	2.8	.29	.46
Persuasion	4%	5	29	20	19	15	8	4.2	.23	.02
Resolving disagreements	5%	7	28	23	16	14	7	4.1	.18	.11
Getting to know someone	5%	29	35	14	7	7	4	3.3	.21	.26
Giving or receiving orders	10%	34	15	22	8	5	6	3.2	.08	.65
Exchanging opinions	25%	42	20	6	5	1	2	2.3	.18	.26
Expressing positive emotions	7%	25	33	16	8	4	6	3.3	.04	.20
Expressing negative emotions	7%	22	22	22	16	5	5	3.5	.17	.66
Sociable relaxation	2%	21	27	21	11	7	10	3.9	.17	.42

Source: Post-Use Questionnaire, N = 102
*p (probability) is level of significance, based on Chi square

Subjective Satisfaction Ratings and Time on Line

The subjective ratings of EIES do tend to be positively related to accumulated hours on line at the time the questions were answered. However, most of the relationships are weak and statistically insignificant. The overall rating of the system (EIES is extremely good-extremely bad) is significantly related to time on line (Chi square = 32.6, p = .04, gamma = -.45). The only other scales showing a significant relationship are personal-impersonal (gamma = -.24, p = .01) and time saving-time wasting (gamma = -.28, p = .05).

Group Differences

Most of the DACOM scales do not show significant differences associated with the user group. However, some do. Using the system for persuasion is most highly rated by members of Group 40 and received the most unsatisfactory ratings from Group 45 (see Table 5-20). Resolving disagreements, significant at only the .09 level, showed a similar pattern. This is to be expected, since they are similar functions.

For "getting to know someone," Group 30 is the most positive, followed by Group 40, and Group 45 is again the most negative. For giving and receiving orders, on the other hand, Group 45 is more split than the others, and Group 54 is the most decidedly neutral (see Table 5-22).

None of the other scale items show differences among groups that are significant at the .10 level or above. The differences that do occur indicate that the specific experiences of the group do have some effect upon ratings of the degree to which the system in the abstract is suitable for some communications purposes.

Table 5-20

Satisfaction with EIES for Persuasion, by Group

	Completely Satisfactory						Completely Unsatisfactory	
Group	1	2	3	4	5	6	7	N
30	0	7%	27%	20%	7%	33%	7%	15
35	4%	16%	28%	12%	20%	12%	8%	25
40	7%	0	45%	10%	21%	10%	7%	29
45	0	0	5%	37%	32%	10%	16%	19
54	0	0	17%	67%	0	17%	0	6
All	3%	5%	28%	21%	19%	15%	9%	94

chi square = 38.3, p = .03

contingency coefficient = .54

Source: Post-Use Questionnaire

Table 5-21

Satisfaction with EIES for Getting to Know Someone, by Group

	Completely Satisfactory					Completely Unsatisfactory		
Group:	1	2	3	4	5	6	7	N
30	0	69%	19%	0	12%	0	0	16
35	0	23%	42%	15%	4%	12%	4%	26
40	10%	28%	41%	10%	7%	0	3%	29
45	0	16%	32%	21%	5%	16%	10%	19
54	0	17%	33%	33%	17%	0	0	6
All	3%	30%	35%	14%	7%	6%	4%	96

chi square = 35.7, p = .06

contingency coefficient = .52

Source: Post-Use Questionnaire

Table 5-22

Satisfaction with EIES for Giving and Receiving Orders, by Group

	Completely Satisfactory						Completely Unsatisfactory	
Group	1	2	3	4	5	6	7	N
30	0	46%	8%	23%	23%	0	0	13
35	13%	39%	0	35%	4%	4%	4%	23
40	11%	37%	26%	7%	4%	4%	11%	27
45	11%	32%	21%	16%	0	10%	10%	19
54	0	0	33%	67%	0	0	0	6
All	9%	35%	15%	23%	6%	4%	7%	88

chi square = 35.8, p = .06

contingency coefficient = .54

Source: Post-Use Questionnaire

ATTITUDES OF OTHER HOUSEHOLD MEMBERS

A communications system like EIES potentially generates reactions not just from direct users. Others observe interaction with the system and form opinions about whether this on line activity adds to, detracts from, or is neutral in terms of its effects on their (off-line) relationship. The most important of the potential groups on which there may be a secondary impact is the family, particularly if the network member uses a terminal at home, and particularly if he or she ties up the only phone line.

Many EIES users do not take their terminal home or talk to their families about their work; their families or living partners are oblivious to it. For those who do take it home, reported reactions vary from great curiosity and enthusiasm to hostility and resentment (see Table 5-23). Reactions of interest, curiosity, and support are much more frequently reported than are negative reactions.

A very lively debate on the impacts of EIES on family life occured in the public conference on "Impacts". Opinions ranged from the point of view that "CC will worsen the detrimental strain that TV and other relatively modern technical developments have put on family bonds" to the assertion that it can strenthen the family by, for instance, allowing spouses separated by travel to remain in contact or permitting parents to work at home rather than leaving their children to go to an office. The intensity of many of the comments on the "pros" and "cons" of having a terminal in the home indicate that the reactions of other household members to CC as well as those of primary users should be included in future studies of acceptance of the medium and its impacts.

Table 5-23

Responses of Other Family Members or Friends

"Seems like a fun thing that I am doing, but it is no big deal to them."

"Curious fascination to irritation (when I bring the terminal home)."

"Huh? They couldn't care less."

"Very interested."

"Enthusiastic, interested, envious in friendly fashion; and they learn things from EIES."

"My wife is moderately interested. My children are enthusiastic."

"Interested. Look for future developments in this technology."

"They dislike my keeping the phone busy too frequently and too long each time."

"Curious skepticism."

"My wife likes it a lot. My wife checks the messages and 'talks' with the systems people."

"Kid plays 'animal' on visits."

"Don't know or care."

"Think it is a fun toy. Are annoyed at tying up the telephone. Are interested in messages that they understand."

"They hardly know."

"That it's great and should be expanded to all areas of communication."

"Oblivious."

"Tolerant; not excited at all."

"Positive."

"Children neutral. Wife negative."

"I have been forced into mainly working on EIES after 5:00 pm because of telephone rates. My occasional latenesses in returning home annoy my wife."

Table 5-23, cont.

"My husband is interested and a bit envious. My children are too young to understand what it is all about, but accept it matter-of-factly."

"Indifferent"

"Mildly interested."

"They find it terribly exciting; 'A giant intellectual C.B.,' as one of them described it."

"Impressed."

"Amusement and amazement."

"Interested."

"They don't care. My son likes it when I bring the terminal home (a practice I just started). so that he can use computer games on another system."

"Encouraging."

"They have no attitudes whatsoever toward it."

"They know nothing about it. It's my dark secret."

"Yet ANOTHER activity to distract me from family life! But generally supportive!"

"Respect and admiration."

"Wife enjoys it, finds it interesting and amusing."

"They are disappointed that, unlike other computer systems I interact with, EIES has no provisions for interstellar combat and similar diversions."

"That damn computer."

"Wife: indifferent. Children: somewhat curious."

"Supportive."

"They think it is interesting... like a toy."

"Amused.--sometimes annoyed"

"A distraction, but they accept it as important."

"Love it."

"Not involved."

Table 5-23, cont.

"Intrigued"

"Enjoyable."

"My wife is excited about the idea and the system."

"Moderately interested."

"Very positive--after we got an extra telephone line for the terminal."

"Positive except when 1) paper accumulates throughout the house, or 2) I become frustrated when system is slow or I have difficulty accomplishing what I intend to do."

"Between EIES and my home computer they sometimes wonder who that strange man is in the study."

"Supportive, interested, excited."

"My children are not involved in and not aware of EIES. My wife knows about it and thinks it's great."

"Wife is a user."

"Wife has mild interest when I take it home."

"Enthusiastic--amazed."

"I don't use it at home. If I did, it might compete with family activities."

"They think it is somewhat useful, but, since they are not as interested in computers, they are not enthusiastic."

"My wife is excited about the idea and the system."

"Moderately interested."

WHAT USERS ARE WILLING TO PAY

Those of a practical nature often state something to the effect that people's attitudes or opinions about a new product or service are beside the point. What really matters is "the bottom line"--will enough people pay enough for the service to make it economically viable?

One problem with the generalizability of the EIES results is that the scientific user-groups were not paying for their use of the system. At the current time, in fact, it is not economically feasible for either an independent scientist or strained academic departmental budgets to pay for the costs of using this form of communication. Even though EIES is both nonprofit and designed to be a low-cost system (using a minicomputer rather than a large mainframe computer), the costs are over $100/month per member. (1981 costs are $75 per month for system use, plus the cost of connecting to the system via a packet switched network and/or the telephone. During the operational trials, TELENET cost $3.75/hour. Rates are now in the $5.00/hour range. Assuming 10-20 hours of connect time per month per user, this is well over $100 a month to use EIES, plus the cost of a terminal).

Table 5-24 shows the median amounts that EIES members said they would be willing to pay for the system, under various conditions. The variables are whether the people are paying out of their own pockets or are being funded from some other source and whether they would be continuing as members of their operational trials research community or would be able to put any group they wanted on line. We have omitted from the calculation of the means and medians in this table respondents who listed "$0" or who said they would pay whatever it cost.

One can see that the amount that the scientists felt they would pay out of their own pockets for continued membership in the EIES research communities (a median of $3.50/hour) would not even pay the TELENET costs, let alone pay for system use. However, the amounts they would be willing to pay under other conditions are in the realm of economic feasibility in terms of supporting system costs.

This analysis has been borne out in practical terms in that enough members were willing to pay the costs of EIES after the end of the operational trials to make the system self-supporting. However, the majority of these pay-your-own-way users are from industry or government and are not paying out of their own pockets. We come to the conclusion that, no matter how valuable systems like this might be for scientists, they are not likely to be able to use such systems unless they are subsidized, as they are for other research tools they use in their work, from libraries to nuclear reactors.

MULTI-VARIATE ANALYSIS: FACTOR ANALYSIS AND STEPWISE MULTIPLE REGRESSION

An attempt at multi-variate analysis was hindered by the number of cases available when using many variables from the pre-use and follow-up questionnaires: if there is no answer available on one of the variables used, then the case is eliminated from the analysis. And the more variables one puts into the multi-variate analysis, the worse it gets. Nevertheless, we were sucessful in determining some interesting clustering of measures of subjective satisfaction, and some important determinants.

The items shown in Table 5-18 were subjected to one of the most widely used approaches to factor analysis, the "PA2" approach (See Kim, 1970) with VARIMAX rotation. (This is the "normal" or "default" type of factor analysis in SPSS). The purpose of the factor analysis was to see how the various dimensions of subjective satisfaction measured empirically cluster together, so that some of them may be combined to derive an index of some underlying factor which several of the individual questions have in common. The results are presented on a graph so that one can actually see how close together the individual questions are when classified by the underlying factors.

Two underlying factors were identified. They seem to correspond to "input frustration" or difficulty, and "output payoff", or satisfaction with what one gets out of the system. Three questions were right in the middle of both factors, which makes logical sense, because they correspond to a kind of balance between input difficulty and output payoff.

The "varimax rotated factor matrix" is shown below, divided into those variables which it was decided to combine into a "payoff factor" index, those which it was decided to combine into an "input difficulty" index, and those which it was decided to omit because they do not load any more clearly on one factor than on the other. The scores are the regression weights of the common factors. (See Table 5-18 for a complete list of the words used on the individual semantic differential scales).

Variable	Factor 1	Factor2
PAYOFF factor		
Good	.73	.39
Stimulating	.86	.16
Productive	.78	.33
Fun	.68	.19
Input Difficulty Factor (INPUT)		
Frustrating	30	.64
Easy	.16	.72
(Related to Neither or Both- not used)		
Time-saving	.59	.44
Friendly	.46	.32
Demanding	.27	.23

Having identified the INPUT and PAYOFF factors, an index was constructed by adding together the scores for the component questions. These were then used in two stepwise multiple regressions, with several predictors entered in order to determine which ones are the most powerful determinants of these dimensions of subjective satisfaction (See chapter two for an explanation of the nature and purpose of stepwise multiple regressions). The results of the regression for PAYOFF satisfaction are shown in Table 5-25. It is most unfortunate that only 44 cases had data for all of these variables. The small number of cases makes it difficult to obtain statistically significant results.

The variables to enter into the multiple regression were selected by first computing bivariate Pearson's correlations and significance levels for the relationship between the two indexes and several possible predictors. Group, previous experience with terminals, and satisfaction with the group leader were eliminated because they did not yield significant correlations. The variables which were related are shown below.

KNOWN= Number of group members known before system use

ESTUSE= estimated number of hours of use per week, before using EIES

NUMBER= Number of persons with whom the user felt in active communication on EIES at follow-up

EIES MET= Number of these persons "met" on EIES

HRSUSE= Number of hours spent on line at time of follow-up

Bivariate Pearson's Correlations

(N of cases shown in parentheses)

Variable	PAYOFF	INPUT
KNOWN	.15 (47) p=.17	.21 (51) p=.07
ESTUSE	.30 (49) p=.02	.21 (54) p=.07
NUMBER	.31 (93) p=.01	.17 (102) p=.05
EIESMET	.35 (97) p=.01	.15 (106) p=.06
HRSUSE	.33 (98) p=.01	.24 (107) p=.01

The stepwise analysis shows that the most important determinant of "PAYOFF" satisfaction is the attitude toward the system before using it, as indicated by estimated hours of use-- once again, we come up with the finding that users somehow knew before communicating on EIES how much they would like the system and how much they were likely to use it and benefit from it. As shown in the stepwise regression correlation matrix in chapter two, the strongest observed correlate of preuse estimates of EIES use is the number of group members known. The variable entered at the second step, which significantly improves the prediction, is the number of persons "met" on EIES. A third variable which improves the prediction somewhat (significant at the .10 level but not the .05 level) is the number of persons with whom one is communicating on EIES. In sum, our most important determinants of satisfaction with what one is getting by using EIES are measures of social connectivity. Once these variables are taken into account, time on line has no independent effect.

None of the variables were significantly related to INPUT satisfaction. The strongest predictor is the number of members known before using EIES. If one knows many other group members, one is not likely to feel that using the system is frustrating or difficult. The second most powerful predictor is the number of new persons met on EIES. Even though these findings are not based on enough cases to yield statistical significance, they are rather fascinating--- one's reaction to trying to use the system actually seems to be determined by social factors--(number of old and new communication partners), and is not at all a product of non-social factors such as previous use of computers or computer terminals, or number of hours of experience using the system.

Just for curiosity, the variable "EIES is Not demanding or intrusive-demanding or intrusive" was correlated with the same set of predictors, since it was furthest away from either of the other factors. The most important determinant of this subjective evaluation is the group to which the user belongs (significant at the .05 level). This finding fits in with our previous observation that things most and least liked about EIES correlated with group membership.

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Table 5-25

Stepwise Multiple Regression

Determinants of PAYOFF Satisfaction Factors

(Note: See text for definition of variables)

CORRELATION MATRIX

	KNOWN	ESTUSE	NUMBER	EIESMET	HRSUSE
PAYOFF	.14	.33	.22	.26	.24
KNOWN		.20	.47	.13	.41
ESTUSE			.16	.21	.46
NUMBER				.44	.38
HRSUSE					.40

N of cases= 44

STEPWISE MULTIPLE REGRESSION

FACTOR	MULT R	R SQUARE	BETA	P
ESTUSE	.33	.11	-.28	.01
EIESMET	.38	.15	-.15	.05
NUMBER	.40	.16	-.10	.10

SUMMARY, CONCLUSIONS, AND SPECULATIONS

1. Learning time is a problem with EIES. Although the reported median for learning the basic mechanics is an acceptable 2.4 hours, more than a third of the users have never mastered the advanced features. Perhaps, however, many of them do not wish to... perhaps they are quite content with a relatively simple set of capabilities to accomplish their communication objectives on line.

2. Although the written documentation (manual) is given generally good ratings, many users will not read through such lengthy printed material. Moreover, the standard introductory manual does not cover advanced or new features. An on-line explanation file, which is complete and up to date, is hundreds of pages long. Although one can search for and retrieve information on just those features or capabilities of interest (like turning to the appropriate page in a printed manual), it seems to intimidate many users. Among the variety of alternative sources of "on-line" help and documentation provided, the most popular is the human user consultants.

3. EIES users' behavior and opinions support the design choice to provide a variety of alternative interfaces, with menus presented first.

4. Users are most likely to name as "the most valuable feature" of EIES not a software feature or capability but rather general characteristics or benefits of the medium, related to the people who use it, such as "diversity of discussions" or "sharing of ideas." In

discussing "useless, distracting or out of place" EIES features, there are frequent complaints about slow system response time, the editor, and the difficulty of remembering the various commands and procedures for interacting with the system. However, the single most frequent category of complaint relates not to the computer system features but to the behavior or quality of performance of those with whom one is communicating: "junk mail," "cute remarks," "useless material" entered, etc.

5. One serious adaptation problem for users of this medium is "information overload." About one in five users "always" or "almost always" feels overloaded with material pouring out of the system, and the majority feel this way at least "sometimes." However, feelings of "information overload" peak at middle levels of experience, and then decrease markedly, even though the users with the most time on line are objectively handling greater amounts of information. The most experienced users have learned how to cope with the rich but potentially overwhelming plethora of materials available to them on line. How they prevent "information overload" at high levels of activity on line is an important topic for further study.

6. When the terminal is used at home, other household members frequently develop strong positive or negative attitudes toward the system.

7. Most users do not generally feel able or willing to pay the full cost of using EIES (more than $100 per month) out of their own pockets.

8. Multivariate analysis indicates that the most important determinants of overall subjective satisfaction with communicating on EIES are aspects of social connnectivity: how many system members one knows before signing on line, how many people one actively communicates with though the system, how many valued new relationships are begun with people "met" on EIES.

Perhaps these systems are like parties. The software is like the refreshments, furnishings and decor. They can help people to enjoy themselves and communicate easily, or they can detract from the occasion. But the main determinant of whether it was a "good" party is the people there and the quality of the social interaction at the party. The party may be held in a mansion and catered by Julia Child, but if nobody talks to you, you don't like it. On the other hand, the party may be held sitting on the floor and feature beer and pretzels... but if all your dearest friends and most valued colleagues are there, you will have a wonderful time.

Chapter Six

IMPACTS ON THE SCIENTIFIC RESEARCH COMMUNITIES

How did the use of EIES for approximately 18 months affect the scientific research communities? In terms of the intellectual and social structure of the group and its ties to other research communities on and off EIES, what happened to communication patterns, cohesiveness, and perceptions of competition in the field? And, most importantly, did EIES in fact help to clarify or resolve theoretical and methodological controversies in the various specialties, as was hypothesized? These questions will serve as the focus of this chapter. Impacts or effects that might be generalizable to any kind of user group, not just scientific research communities, will be the subject of the next chapter. Such more "general" impacts are changes in amount and type of communication, effects on productivity, and general effects on the way that users work and think.

METHODOLOGICAL PROBLEMS AND PROCEDURES

At the end of 18-24 months on EIES, there had been considerable turnover in the composition of many of the scientific groups, with dropouts and inactives replaced by new members, a portion of whom in turn were inactive and replaced. Thus, even though the size and discipline of a group were the same at post use as at pre use, it was a different group because the individuals belonging to it had changed. This is true for a longitudinal study of any scientific research community, of course, because healthy research communities have new members join and older members retire or stretch their energies into new specialties. However, the rate of replacement was exceptionally high for the on-line communities.

There are two approaches to the data analysis. One gives us the largest number of cases to look at, permitting examination of changes within each group. This approach is to compare the distribution of all responses to the same questionnaire item at two points in time. The problem is that we cannot know to what extent differences were produced because the scientific community changed, or because a somewhat different set of individuals responded.

The second approach is to examine the responses for only those individuals who answered the full set of questionnaires. We then use methods suitable for panel data.

For example, we can take those individuals who perceived a great deal of competition in their specialty at time 1 and see whether they perceived competition at time 2 as the same or less. However, since we have pre-use or follow-up questionnaire data for many EIES members who did not complete a post-use questionnaire, or vice versa, this reduces the number of cases to a small number for most analyses, unfortunately, resulting in no statistical significance.

We shall generally rely on the cross-sectional data describing the research communities at two points in time, since this does not require us to eliminate so much data that the cases remaining are insufficient in number to reach any conclusions. The panel data will be discussed, however, in order to supplement the cross-sectional data with the available information about how specific respondents changed their perceptions of their research specialties over time.

CHANGES IN SCIENTIFIC COMMUNICATION

Table 6-1 shows that the majority of users of EIES report that they spend more time communicating with other members of their scientific community as a result of use of the system. As would be expected, this is strongly related to the amount of time they spend on line. At the lowest end of the system-use scale, half spend less time communicating with their group than they did before it was available, whereas, among the heaviest EIES users, 90% have invested more time in communications. Perhaps the most surprising aspect of the reported changes, however, is how little time some scientists spend communicating within their specialty community. For more than a quarter of the scientists who spend less than 20 hours on line over an eighteen to twenty-four month period, this is reported to be more time than they would otherwise have devoted to communication with their peers.

Table 6-1

Relative Time Investment in Communication with Specialty Group, by Hours on Line

Hours	Less	More	Same	N
1-19	50%	27%	23%	26
20-49	43%	43%	13%	30
50-99	33%	63%	4%	24
100+	10%	90%	0	19
All	36%	53%	11%	99

Source: Post-Use Questionnaire

Chi square= 21, p=.01

Contingency coefficient= .42

Question: Compared to the conventional means of communicating with your group, has EIES:

Involved less of your time

Involved more of your time

Involved the same amount of time

Broadening of Contacts rather than Encapsulation

One question asked at the beginning of this research project was whether the use of EIES might not "encapsulate" the communications of its members within the relatively tiny on-line group of peers. Such a process would have the negative effect of gradually decreasing contacts with researchers in other specialties and thus impede the valuable and fortuitous process of cross-fertilization of ideas.

On the contrary, EIES is more likely to broaden contacts with local colleagues, as system members become indirect links between the on-line and off-line worlds. Table 6-2 shows that, for three quarters of the scientists, access to EIES has no effect on the amount of communication with other scientists in the specialty who do not have system access. There are practically no reported instances of a perceived decrease in communications with non-EIES colleagues as a result of system use. However, a significant minority, surprisingly even among those who do not spend much time on line, report that communications with these colleagues has actually increased. The explanation is probably that they are serving to relay information about and from the system to off-line colleagues.

Table 6-3 indicates that scientists using EIES are much more likely to report an increase in "communications with researchers in other disciplines or specialty areas" (43%) rather than a decrease (only 1 person, or 1%). There are no statistically significant differences among groups for this finding, though the percentage reporting an increase did vary from only 17% for Group 54 to 54% for Group 40.

There is a moderately strong relationship with time on line, as would be expected. Given our data on the large amount of electronic migration among groups and conferences that took place, most of this perceived increase in communication across disciplines is probably on line rather than off.

Table 6-2

Impact on Communication with Colleagues in the Specialty but Not on EIES

By Hours on Line

Hours	Increased	Decreased	No change	N
1-19	36%	0	64%	28
20-49	24%	3%	73%	33
50-99	8%	4%	88%	25
100+	32%	5%	63%	19
All	25%	3%	72%	105

Source: Post-Use Questionnaire

Chi square= 7.2, p=.30

Contingency Coefficient= .25

Question: Has the use of EIES affected your communication with any of the following?

Colleagues in your specialty but not on EIES

(Checklist- Increased, Decreased, No Change)

Table 6-3

Increase in Communications with Researchers in Other Disciplines or Specialty Areas

C umulative Hours	Increased	Decreased	No Change	N Responding
1-19	30%	0	70	27
20-49	38%	3	59	32
50-99	48%	0	52	25
100+	68%	0	32	19
All	44%	1	55	103

Source: Post-Use Questionnaire

Chi Square=9.7, p=.14

Contingency Coefficient= .29

PERCEPTIONS OF SPECIALTY GROUP COHESIVENESS

Table 6-4 shows the distribution of responses by specialty group on the perceived sociometric or network structure of the specialties at the follow-up and post-use points. Some groups show a slight tendency toward perception of a less densely knit, less connected or integrated structure, moving to perception of isolated individuals from former perception of cliques or an integrated community. Group 30, Futures Research, and Group 54, Mental Workload, show this pattern most strongly. This is the opposite of the effect that had been hypothesized. However, examination of the panel data suggests that the apparent changes are attributable to differences in the persons responding.

Looking at the panel data, there were, overall, no significant changes between the follow-up questionnaire and the post-use questionnaire approximately 1 year later in the extent to which specialty groups were perceived by their members to be composed of isolated individuals, of cliques, or of an integrated group of peers. Most were likely to report the perception--i.e., cliques at post use--if they had perceived cliques at follow up. Overall, the correlation (gamma) was .49, significant at the .003 level. Among those who did give different reports, there was almost as likely to be a reported decrease in cohesion as an increase. For instance, among the 6 who reported their group as a single integrated research community at follow up, 4 saw it as dissolving into cliques or individuals by post use. Meanwhile, the total number of persons reporting an integrated research community increased from 6 to 9.

Thus, there is a tendency, albeit very weak, for more persons to see the specialty as integrated at post use.

The numbers of persons are too small to produce any significant differences. In addition, the measure is too gross to be valid or accurate. Detailed measures of connectivity within specific specialties, such as those collected for Group 35 and reported by Freeman and Freeman (1980), may show some significant differences.

Table 6-4

Changes in Perceived Cohesiveness of the Research Specialties:

Post-Use

Group	Individuals	Cliques	Integrated	Number Responding
30	61%	33	6	18
35	31%	50	19	26
40	45%	48	7	29
45	53%	29	18	17
54	57%	29	14	7

chi square = 7.3, p = .51

Follow-Up Questionnaire (About 1 Year Earlier)

Group	Individuals	Cliques	Integrated	Number Responding
30	35%	50	15	20
35	33%	67	0	24
40	52%	45	0	29
45	30%	45	20	20
50	60%	20	20	5
54	25%	63	13	8

chi square = 17.6, p = .29

Follow-Up Questionnaire

Question: At the present time, which of the following best describes your EIES group?

More a collection of individuals than a research community

A set of cliques or subgroups with interests and activities in common, but not an integrated community

A well-integrated research community that shares many interests and activities in common

Changes in Perception of an Intellectual Mainstream

In all except Group 45, a larger proportion of specialty group members felt that there was an "intellectual mainstream" in the specialty after eighteen months of EIES discussions than before EIES use. Whatever role EIES may have played in clarifying the theoretical and methodological controversies in the fields, it apparently led to a tendency for some of the group members to feel that they were a little closer to recognizing a dominant "paradigm" that characterizes research in their fairly new and interdisciplinary areas. The changes were not very large, however, and the reversal in Group 45 shows that this is a contingent sort of development. As will be seen later, Group 45 is the one in which there was also an increase in perceived competitiveness and in which there were very few perceived advances in clarifying specific theoretical and methodological issues.

Group 54 is omitted from this table because the small number of responses would make the pre vs. post comparison invalid.

Turning to the panel data, a T test was used on the question of whether individual scientists felt more in the mainstream or more isolated as the EIES trials progressed. This was measured on an ordinal scale on the pre-use and follow up questionnaires. The scale was:

1= Completely in the mainstream

2= Somewhat in the mainstream

3= Neither in the mainstream nor isolated

4= Somewhat isolated

5= Completely isolated

There were only 53 cases with both pieces of data. Surprisingly, there is a significant shift toward feeling LESS in the "intellectual mainstream" of the specialty. The mean at time one was 1.3, and at time two, 2.3 (T= 4.78, p= .01). This is a rather surprising finding, and one can only speculate on the reasons. Perhaps the on-line subgroup recognized its on line discussions and conclusions as separating them from accepted or taken for granted theories or priorities shared by the rest of the "off line" world in their specialty.

Table 6-5
Changes in Perception of an Intellectual Mainstream, by Specialty Group

	Pre Use		Post Use	
Group	% yes	N	% yes	N
30	54%	13	63%	19
35	27%	22	31%	26
40	33%	30	41%	29
45	71%	14	56%	18

Question: Is there a commonly accepted "intellectual mainstream" in the specialty?

Changes in Perceptions of Competition for the Specialty Groups

Looking at the cross-sectional data, there was an apparent increase in the perception of competitiveness within the scientific specialty groups over the 18 months that they used EIES (see Table 6-6). However, the panel data indicate that there is a selection process at work as well as a change in attitudes among indidual members.

The cross-sectional data in table 6-6 show a smaller number of members of most groups reporting low or non-existent competition at post use than at pre-use. However, this trend is not constant across groups. There was practically no change at all for Group 40, General Systems Theory. The most dramatic change was for Group 45, which started out with only 11% perceiving very intense or intense competition and ended up with 43%.

The second table on perceptions of competition (see Table 6-7) shows that the changes are concentrated within specific kinds of competition. There is a dramatic increase in all groups in perceived scarcity of or competition for funds. Those who perceived unethical behavior among their peers dropped out of EIES and did not respond to the post-use questionnaire, so this reason practically disappears. There is also some increase in perceptions of strongly opposing views.

However, the panel data on the 45 to 53 individuals who answered both questions indicate that the apparent changes in perceived overall level of competition are due to turnover in membership, with those perceiving little competition within the specialty more likely to drop out. On the question on overall degree or intensity of competition, the mean was 3.2 on the one to five scale used, at both points in time. (T= .17, p=.8) For the specific kinds of competition, there was a significant increase for the same types that are apparent in the cross sectional data: competition over funds, perception of rival groups, and strong opposing views. (For example, with "yes" coded as "1" and no check of a reason coded as 2, the mean for "opposing views" was 1.7 at pre-use and 1.4 at post use; T= 3.5, p=<.05). Thus, the conclusion derived from the cross-sectional data about increases in perceptions of specific kinds of competition with the specialties as an apparent result of discussions and interactions on the system does hold up with the panel data.

Table 6-6

Perceived Degree of Competition by Groups:

Post-Use Questionnaire

Group	Very Intense or Intense	Moderate	Low or Nonexistent	Number Responding	
30	11%	39	59	100%	18
35	15%	65	19	99%	26
40	17%	43	40	100%	30
45	11%	67	22	100%	18
54	25%	50	25	100%	8
All	15%	53	32	100%	100

Source: Post-Use Questionnaire

Pre-Use Questionnaire

Group	Very Intense or Intense	Moderate	Low or Nonexistent	Number Responding
30	9%	55%	36%	11
35	24%	57%	19%	21
40	16%	39%	45%	31
45	43%	50%	7%	14
54	0%	100%	0%	5
Total	21%	51%	28%	82

Chi square = 16.6, p = .03
Source: Pre-Use Questionnaire

Question: "How would you rate the degree or intensity of competition within your specialty?"

Table 6-7

Percentage Checking Specific Reasons for Competition, by Group:

Post-Use

Group	Funds	Rivals	Drive	Unethical	Opposing Views
30(N=15)	47%	20%	50%	7%	53%
35(N=23)	35%	52%	61%	0	35%
40(N=26)	54%	38%	35%	4%	58%
45(N=17)	82%	29%	59%	0	12%
54(N=7)	57%	57%	29%	0	43%
chi square	9.2	5.6	5.4	2.7	10.3
p	.05	.23	.25	.17	.04

Source: Post-Use Questionnaire, N = 88

Pre-Use

Group	Funds	Rivals	Drive	Unethical	Opposing Views
30(N=10)	18%	0%	50%	10%	50%
35(N=20)	21%	55%	65%	5%	30%
40(N=25)	32%	20%	44%	4%	36%
45(N=13)	21%	31%	61%	15%	8%
54(N=5)	9%	20%	20%	40%	0%
chi square	2.5	11.9	4.5	7.2	7.7
p	.64	.01	.33	.12	.10

Source: Pre-Use Questionnaires
number responding = 73

Question: "What are the reasons for this competition?" (Check all that apply.)

Scarcity or competition for funds
Rival groups of collaborators
High achievement or success drive of people in the field
Some persons act unethically.
Strong opposing views

Better Understanding of Others' Work

The majority of EIES users agree that the increased communication with their peers facilitated by using the system has changed their understanding of the interests and activities of other scientists in the specialty. The more time they spend on line, the more likely it is that such increased understanding will occur (Table 6-8). There are significant differences among the specialty groups in the extent to which this process occurs (Table 6-9). Such impacts are not related to our other measures of group success: the two groups in which there is the most "increased understanding" reported include one of the most successful (General Systems) and one of the least successful (Mental Workload).

About half of the scientists report the related perception that use of the system has changed their views of how their own work relates to that of others in the specialty (Table 6-10). Those who spend at least fifty hours on line are most likely to report this perception.

Table 6-8

Extent to Which EIES has Changed Understanding of Others in Specialty, by Hours on Line

Hours	Strongly Agree	Agree	Neither	Disagree or Strongly Disagree	N
1-19	3%	45%	17%	35%	29
20-49	15%	42%	36%	6%	33
50-99	16%	28%	22%	7%	25
100+	21%	53%	21%	5%	19
All	13%	48%	26%	13%	106

Source: Post-Use Questionnaire

Chi square= 20.1, p=.02

gamma= .34

Question: EIES has changed my understanding of the interests and/or activities of others in my specialty.

Table 6-9

Whether EIES Increased Understanding of Others in Specialty by Specialty Group

Group	Strongly Agree or Agree	Neither	Disagree or Strongly Disagree	N
30	44%	33	22	100%=18
35	65%	15	19	100%=26
40	77%	23	0	100%=30
45	37%	42	21	100%=19
54	86%	14	0	100%=7
All	61%	26	13	100%=100

Chi square (computed on uncollapsed data)=22.3, p=.03
Source: Post Use Questionnaire

Question: EIES has changed my understanding of the interests and/or activities of others in my specialty. (Strongly Agree> Strongly Disagree).

Table 6-10

Whether EIES has Changed Views of How Work Relates to That of Others

Hours	Strongly Agree	Agree	Neither	Disagree or Strongly Disagree	N
1-19	10%	21%	21%	48%	29
20-49	6%	36%	30%	27%	33
50-99	8%	60%	16%	16%	25
100+	21%	26%	32%	21%	19
All	10%	36%	25%	29%	106

Chi square= 16.5, p=.06

Gamma= .28

Source= Post Use Questionnaire

Question: EIES has changed my view of how my own work relates to that of others in my speciality.

(Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly disagree)

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CLARIFICATION OF THEORETICAL AND METHODOLOGICAL CONTROVERSIES

One of the most fundamental of the issues related to the use of a technology such as EIES is whether it can speed the development of a disciplinary paradigm or the process of paradigm change when a previous theoretical and methodological framework that has been dominating the field does not seem adequate for answering fundamental questions or guiding fruitful research. There are at least three parts of this process that can be identified: formation of new approaches, clarification of the nature of the differences between the old and the new approaches, and resolution of the controversy by some sort of synthesis or replacement, or through the demise of the proposed new approach.

Overall, about half of EIES users felt that the use of the system had clarified theoretical controversies within the field. It was generally not felt that there had been a "great deal" of clarification, but only that there had been "some." Many of the comments accompanying this section of the post-use questionnaire pointed out that the controversies among competing theoretical positions had been clarified, but not resolved. The amount of progress on theoretical conflicts varied by specialty, with General Systems Theory (Group 40) reporting the most progress, and Devices for the Disabled, a relatively applied and non-theoretical discipline, the least (see Table 6-11). As would be expected, perception of clarification of theoretical controversies is very strongly related to amount of time spent on line (Table 6-12). Almost all of the heavy users of the system felt that this was one outcome of their use of EIES, whereas those who had spent less than an hour a month on line on the average obtained no such benefit.

Table 6-13 lists the specific theoretical issues which were named by participants in the various specialty groups as having been clarified. Group 30 could not come up with very much specific. Group 40, which generated the largest percentage overall of perceived progress on theoretical issues, focussed mainly on the open vs. closed system paradigms.

Generally, use of EIES was seen as somewhat less likely to have helped clarify methodological controversies in a scientific specialty than theoretical issues. However, this was not true in all groups. Social network theory members were more likely to perceive methodological progress than theoretical progress, and named several specific methodological clarifications. (See Tables 6-14 and 6-15.)

Table 6-11

Clarification of Theoretical Controversies, by Specialty Group

Group	Great Deal	Somewhat	No	N
30 (Futures)	6%	50	44	18
35 (Social Networks)	4%	44	52	25
40 (General Systems)	14%	52	34	29
45 (Devices)	5%	16	79	19
54 (Mental Workload)	0	57	43	7
All	7%	43	50	98

Source: Post-Use Questionnaire

Chi square= 11.9, p=.15

Question: Has EIES helped to clarify any theoretical controversies in the specialty area?

-yes, a great deal

-yes, somewhat

-no

Table 6-12

WHETHER USE OF EIES HAS CLARIFIED THEORETICAL CONTROVERSIES, BY TIME ON LINE

	Great Deal	Some	No		N
1-19 hours	0%	18%	82%	100%	28
20-49 hours	6%	38%	56%	100%	32
50-99 hours	8%	52%	40%	100%	25
100+ hours	21%	68%	11%	100%	19

Chi square = 26.761 p = .0002 gamma = .644

Source: Post-Use Questionnaire
Question: Has EIES helped to clarify any theoretical controversies in the specialty area?
yes, a great deal
yes, somewhat
no If yes - please explain briefly the theoretical issue which you think has been clarified through EIES discussions, and the extent to which it has been resolved.

Table 6-13

Nature of Perceived Theoretical Clarifications, By Group

Group 30 (Futures Research)

1. Cross impact (expect a paper to be written)

2. Exploring concepts of decentralization

3. Subjective probability

GROUP 35 (Social Network Analysis)

1. Clarification of differences in approaches to structure.

2. On the issues of cognitive salience of networks, the conference has helped by expanding the controversy (getting opposing views out in the open).

3. We have a clearer idea of the areas in which there is diversity of conceptualization and interpretation and where more work needs to be done.

4. C363 was very useful, though it has not RESOLVED the problem of centrality measures.

5. Homological algebra may be useful?

6. The role and meaning of Atkin's q-analysis is being clarified.

7. Concept of centrality has been clarified, but not resolved.

GROUP 40 (General Systems Theory)

1. The open system/closed system debate helped to clarify the difference between general systems theory and cybernetics.

The issue has been raised but is still not widely understood.

2. Open vs. closed paradigm.

3. Some agreement on terminology.

4. The "open/closed" paradigm debate has sharpened the issues involved.

Table 6-13, cont.

5. The open-closed systems controversy; work on the glossary.

6. The problem of large scale system-forming; interaction with "information overload" problems.

Open and closed system probably obsolete as fundamental terms.

7. System forming and system evolution.

8. It has tried to identify the areas (set a boundary). The open system/closed system debate.

9. Self-reference. Open vs. closed systems.

10. Forester model.

11. Open/closed system.

12. Open-closed system: differences exist.

13. Scope of field.

GROUP 45 (Devices for the Disabled)

1. Problems of marketing and commercializing devices- not resolved at all.

2. The kind of information that needs to be sent to government policy makers.

GROUP 54 (Mental Workload)

1. Information theory measures. Man-machine design. (not resolved)

2. Definitions/limitations

TABLE 6-14

Clarification of Methodological Controversies, by Specialty Group

Group	Great Deal	Somewhat	No	N (100%)
30	0	50	50	18
35	8%	46	46	26
40	0	31	69	29
45	5%	21	74	19
54	0	50	50	6
All	3%	38%	59%	98

Source: Post-Use Questionnaire

Chi square =9.1, p=.32

Question: Has EIES helped to clarify any methodological controversies in the specialty area?

-yes, a great deal

-yes, somewhat

-no

Table 6-15

Named Methodological Controversies which EIES has Helped to Clarify

Group 30 (Futures Research)

1. structural models- classificatory scheme developed

2. cross impact methodology

3. The role of modelling

4. structural analysis

Group 35 (Social Network Analysis)

1. e.g., clarification of the topological algebra approach to structure

2. My conference began to work on methodological problems in field work. Unfortunately we ran short of time.

3. Blocks and cliques- delineation and measurement are more clearly specified.

4. The discussion about my experiment on EIES was very useful in helping to define the issues

5. Reality of networks

6. Different programs and their best uses.

7. Issue of informant accuracy has been clarified, though not resolved.

Group 40 (General Systems Theory)

1. The discussion about DYNAMO was useful

2. Systems dynamics discussion

Group 45 (Devices for the Disabled)

1. The need for a data base

2. How manufacturers design, implement and evaluate. We are getting more clinical input.

3. In terms of evaluation procedures

SUMMARY AND CONCLUSIONS

As a result of using EIES for a period of 18-24 months,

A. Total communication within the scientific specialty increases.

1. The majority of EIES members spend more time communicating with their specialty group colleagues than they otherwise would.

2. Three quarters report no change in amount of communication with off-line colleagues in the specialty. One quarter report an increase. Thus, there is an expansion of indirect communication ties, rather than an "encapsulation" of the on-line group. This lack of negative impact on communication with off-line collegues is an important finding.

3. Almost half report an increase in communication with scientists in other specialities or disciplines, and practically none report a decrease.

B. As a result of this increase in communication:

1. There is not an increase in the perceived degree of integration within the specialities. At the end of the observed period of EIES use, as at the beginning, the specialities are generally seen as "collections of individuals" or "sets of cliques," rather than as well integrated research communities.

2. There is no change in the extent to which the scientists believe that there is an "intellectual mainstream" or well developed paradigm in the specialty.

3. There is a significant change in the extent to which the individual scientists perceive themselves as "in" such a mainstream, to the extent that one exists. The change is toward perceiving themselves as farther "out" of the mainstream. This is an unexpected result.

4. There is a tendency for perception of competitiveness within the specialty, particularly competition related to competing ideas and competition over funds, to grow.

5. There is an increased understanding of the interests and activities of other scientists in the specialty, and of how one's work relates to theirs.

C. With regard to the hypothesized process of clarification of theoretical and methodological controversies, about half the scientists feel that use of the system has somewhat clarified the nature of theoretical controversies within their specialities. Such perceptions vary significantly among the specialty groups and increase with time on line. Clarification of methodological controversies is less frequently perceived. Resolution of the controversies has not occurred.

Perhaps the increased communication that occurs on EIES has effects like those of a political campaign. One becomes more aware of the issues on which there is disagreement, and of the divisions within the (scientific) society. And perhaps one needs a structured process like an "election" to resolve these disagreements.

The findings reflect the participants' judgments that EIES is better for generating ideas and exchanging opinions than for resolving disagreements. However, controlled experiments indicate that it is possible to create structured processes of communication within the medium that do make it likely that a group will resolve its differences and reach consensus. Either formal human leadership processes, or a decision aid based on systematic computer feedback on the nature of differences of opinion as expressed through formal "voting," have enabled groups on EIES to reach total consensus (See Hiltz, Johnson, and Turoff, forthcoming). It would be interesting to see if future groups of scientists could resolve the controversies which surface as a result of their computerized communication with the assistance of such special structures for generating consensus.

CHAPTER SEVEN

IMPACTS ON COMMUNICATION PATTERNS, WORKING PATTERNS, AND PRODUCTIVITY

In this chapter, we look at the perceived impacts of EIES which might be generalizable to any type of professional or managerial user. There are four sets of questions that the data presented address:

1. How does use of a system such as EIES change the amount of use of other communication media? For instance, does it substitute for travel, add to travel by stimulating contacts with colleagues in other locations, or have no effect on travel?

2. Can social relationships and working relationships be formed and/or sustained on an electronic communications network?

3. Are there any general impacts on the way in which knowledge or information workers (of which scientists are our example for this study) think and work?

4. What are the impacts on productivity? This includes the provision of the means to higher productivity, such as better access to information and ideas; and perceived impacts on the total quantity and quality of work accomplished.

Finally, we will use multivariate analysis and a PATH diagram to pull together the model which emerges of the causal chain of EIES use... from determinants of amount of use of the system, through the effects of use on communication patterns and productivity.

MEDIA SUBSTITUTION?

One possible expectation is that a computerized conferncing system can SUBSTITUTE for communication via other media, taking the place of mail, telephone, or face-to-face meetings. In the case of scientific communities, information exchanges on line might conceivably even substitute for book or journal reading, in the sense that the time invested in reading papers and conferences on line might be subtracted from some fixed total amount of time available for "keeping up" with the professional literature in one's field. Under the substitution model, one would expect a decrease in the use of other media.

Some of the greatest hopes for economic viability of computer-based communication systems stem from the idea that it may replace more expensive means of communication. Nilles et al. (1976) focus on the ability to telecommute to work rather than waste time and petroleum resources on daily commutation to an office. Kollen's (1975) study looks at "travel/communication tradeoffs" mainly in terms of substitution for business trips at which face-to-face meetings take place.

One of the stated objectives for the use of message systems is usually to replace the letter or the internal memo or the telephone call. For instance, one goal/justification of the electronic mail system tried by Owens Corning, as reported by McNurlin (1980:2-3) was cost displacement through substitution for mail and telephone:

> ... experienced users typically replaced four to six

communications a day, which, with a future projected population in the company of 1500 users, would show replacement savings of $600,000 a year.

On the other hand, one could speculate that perhaps computer-based communication may be ADDED ON to other communications rather than substituting a new mode. This may be particularly true with a system that includes only a relatively small number of addresses or members, with most of the people whom one communicates not available on line. One might under these cicumstances maintain one's usual communications channels but add on to them new communication with people who have not previously been easily accessible. Under the add-on model one would expect to see use of other communication modes remain constant ("no effect").

A third hypothesis might be termed communication EXPANSION. This model pictures the CC based communication being added on to existing communications; and then stimulating more communications via other media. This might take the form of telephone or travel or mails to supplement CC comunication with people met on EIES, increased reading of books or journals due to discussions and references encountered on line, or increased communication with off-line colleagues that is stimulated by system use. Under the expansion model, one would expect to see that use of other media actually increases.

Whether substitution, add-on, or expansion phenomena are observed will of course be expected to vary according to the total amount of use made of a system. At low levels of use, one would not expect it to affect other communications very much one way or the other. It is probably the EIES users who spent a relatively high amount of time on line (100 hours or more over eighteen to twenty-four months) who are most predictive of the potential media substitution effects, should such systems become widely used within an organization or interest community. Thus, we will look at reported effects cross-tabulated by amount of time on line. To the extent that significant differences are observed among the user groups on EIES, it indicates that media substitution effects are also dependent on application (task, size and social cohesion of the group, etc, are all bound up in differences among the groups on the EIES system).

In Tables 7-1 and 7-2, we see that there is generally an "add on" effect in relation to mail and telephone, but as system use increases, the "substitution" effect becomes more prominant. Overall, a quarter of all members and half of the heavy users report a decrease in the amount of use of the telephone, as a result of using EIES. However, a minority demonstrate an "expansion" effect: 14% overall report an increase in the use of the telephone attributable to using EIES, and this increase is also directly related to amount of use of the system.

The pattern for mail is similar, only stronger. That is, at all levels of system use, there most likely to be "no change" in the use of mail as a result. But the likelihood of both reported decreases (substitution of CC for mail) and of reported increases (more mail as a result of system use) varies directly as a function of amount of use of the system. Among medium to heavy users, substituion of CC for mail is the modal pattern; but expansion also increases to approximate equality in frequency with the "add on" pattern.

A probable explanation is that on-line communication substitutes for some mail or telephone but stimulates other contacts that might not take place otherwise. For instance, users may apprise one another of available preprints or other documents, which are then sent by mail. If a subject of mutual interest is likely to take a great deal of discussion, participants who find themselves on line at the same time frequently seem to decide to talk it over on the telephone to resolve an issue or to get another set of cues about one another's feelings. In other words, qualitative observations suggest that dyads resort to the telephone as a supplementary means of communication for fairly long (ten minute or more) conversations, particularly if they find one another on line at the same time and are thus obviously available to take a call. It is the heaviest users and those who make the most new contacts who are most likely to expand their use of mail and telephone as a result of CC.

Tables 7-3 and 7-4 indicate that the prevalence of substitution, expansion, or add-on effects related to mail or telephone is somewhat dependent on the group context. Among EIES users, nobody in Group 30 reported an increase in the use of mail or telephone as a result of using EIES. This futures research group had the largest, most active conference, and thus a great deal of group rather than dyadic communcation, for which mail and telephone are most suitable. Paradoxically, Group 40 was comparatively likely to report both increases and decreases in the use of mail and telephone. Group 45, which was an information exchange about R&D and kinds of devices for the handicapped, was the most consistent in reporting decreases but not increases in the use of mail and telephone.

Turning to travel substitution, attendance at professional meetings was separated from travel to make a personal visit with a colleague. Table 7-5 indicates that system use does not have any significant impact on attendance at professional society meetings. 80% report "no effect", and those who do perceive an effect are almost as likely to report an increase as a decrease, at all levels of system use. In terms of travel for a personal visit, there is more likely to be a perceived impact, and once again, such travel is about as likely to increase as to decrease. Among the heaviest users of the system, almost a quarter report an increase in travel for this purpose. It would seem, therefore, that as long as travel budgets are not cut, contact with colleagues on line is about as likely to stimulate travel as to substitute for it. Anecdotal evidence suggests that among those who interact a great deal on line but have never met in person, there is a tendency for curiosity to prompt extensions to business or personal trips made for other purposes, in order to meet with one's on-line acquaintances.

The reading of professional books and journals is much more likely to increase rather than decrease as a result of using EIES (Table 7-7). Apparently the discussions with one's colleagues lead to more interest in reading journals, since the greater the amount of time spent on line, the more likly it is that such reading increases. In Table 7-8, we see that changes in reading patterns are group dependent as well as being related to time on line. Group 54 is the only community in which a significant proportion report a decrease in professional literature reading. Group 40, which had a very lively paradigm debate on open vs. closed system concepts, has the most members reporting an increase in reading. (The difference in overall totals is due to the omission of Group 50 in these data; a disproportionate number of these individuals report a decrease).

In Table 7-9, we observe the perhaps surprising phenomenon that use of EIES is more likly to increase than decrease communication with one's co-located (off-line) colleagues. Even more surprising is that the lowest level users are most likely to report an increase in communication with colleagues within their own organization as a result of using EIES. Practically no one reports a decrease as a result of using EIES in communication with co-located colleagues. Perhaps the large proportion of low level users who report an increase in local communication can be explained by their use of the system as a kind of toy which they occasionally demonstrated to collegues as a curiosity or status symbol. Since we did not ask about the content of off-line communications that were increasing for any of the modes, however, we can only speculate about the nature of it.

In sum, for all modes of communication, low levels of system use are most likely to have no effect on the use of other communication media; system use is simply added onto existing communication. However, at high levels of system use, one is very likely to also expand the use of other communications media as an adjunct to on-line communications. This corresponds to reports presented in the previous chapter that, especially among those who spend a lot of time on line, the total amount of time devoted to communications increases significantly.

Table 7-1

Impact on Amount of Use of Telephone, by Hours on Line

Hours	Increased	No effect	Decreased	N
1-19	11%	71%	18%	28
20-49	6%	81%	13%	32
50-99	24%	52%	24%	25
100+	17%	33%	50%	18
All	14%	63%	23%	103

Source: Post-Use Questionnaire

Chi square= 16, p= .01

Gamma= .14

Question: Has the use of EIES changed the amount of your use of other media in the last year? (Media checklist with increased- No effect- Decreased as choices)

Table 7-2

Impact on Amount of Use of Mail, by Hours on Line

Hours	Increased	No effect	Decreased	N
1-19	11%	68%	21%	28
20-49	19%	47%	34%	32
50-99	32%	28%	40%	25
100+	22%	28%	50%	18
All	20%	45%	35%	103

Source: Post-Use Questionnaire
Chi square= 11.9, p= .06
Contingency Coefficient= .32

Question: Has the use of EIES changed the amount of your use of other media in the last year? (Media checklist with increased- No effect- Decreased as choices)

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Table 7-3

Effect on Telephone Use, by Group

Group	30	35	40	45	54
Increased	0%	12%	24%	11%	29%
No Effect	83%	72%	45%	56%	42%
Decreased	17%	16%	31%	33%	29%
	100%	100%	100%	100%	100%
N	18	25	29	18	7

Source: Post-Use Questionnaire
Chi square = 10.5 p = .10

Question: Has the use of EIES changed the amount of your use of other media in the past year?

Table 7-4

Effects on the Use of Mail, by Group

Group	Increased	No Effect	Decreased	N
30	0%	67	33	18
35	28%	40	32	25
40	37%	30	33	30
45	12%	35	53	17
54	14%	43	43	7
All	22%	41	37	97

Chi square=13.9, p=.08
Contingency coefficient= .35

Question: Has the use of EIES changed the amount of your use of other media in the last year?

(Checklist included - Mails- Increased, No effect, Decreased)

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Table 7-5

Impact on Amount of Travel to Professional Meetings, by Hours on Line

Hours	Increased	No effect	Decreased	N
1-19	7%	83%	10%	29
20-49	7%	81%	13%	31
50-99	12%	88%	0	25
100+	17%	61%	22%	18
All	10%	80%	11%	103

Source: Post-Use Questionnaire
Chi square= 7.7, p=.26
Contingency Coefficient= .26

Question: Has the use of EIES changed the amount of your use of other media in the last year? (Media checklist with increased- No effect-Decreased as choices)

Table 7-6

Impact on Visits with Researchers in Other Locations, By Hours on Line

Hours	Increased	No effect	Decreased	N
1-19	11%	82%	7%	28
20-49	13%	69%	19%	32
50-99	8%	88%	4%	25
100+	22%	50%	28%	18
All	13%	74%	14%	103

Source: Post-Use Questionnaire
Chi square= 10.1, p= .12
Contingency Coefficient= .30

Question: Has the use of EIES changed the amount of your use of other media in the last year? (Media checklist with increased- No effect-Decreased as choices)

Table 7-7

Impact on Reading Journals or Books, By Hours on Line

Hours	Increased	No effect	Decreased	N
1-19	17%	75%	7%	29
20-49	25%	63%	13%	32
50-99	32%	64%	4%	25
100+	44%	39%	17%	18
All	28%	62%	10%	104

Source: Post-Use Questionnaire
Chi square= 7.9, p=.24
Contingency Coefficient= .27

Question: Has the use of EIES changed the amount of your use of other media in the last year? (Media checklist with increased- No effect- Decreased as choices)

Table 7-8

Change in Amount of Reading of Journals or Books, by Group

Group	Increased	No effect	Decreased	N
30	22%	78	0	18
35	36%	60	4	25
40	40%	57	3	30
45	6%	94	0	18
54	29%	43	29	7
All	29%	67	4	98

Chi square=20.8, p=.01
Contingency coefficient =.42

Question:

Has the use of EIES changed the amount of your use of other media in the last year?

(Reading journals or books... Increased, No effect, Decreased)

Table 7-9

Impact on Communication with Colleagues at One's Own Organization

By Hours on Line

Hours	Increased	Decreased	No change	N
1-19	43%	0	58%	28
20-49	15%	6%	79%	133
50-99	20%	8%	72%	25
100+	16%	0	84%	19
All	24%	4%	72%	105

Source: Post Use Questionnaire

Chi square=10.8, p=.09

Contingency Coefficient= .30

Question: Has the use of EIES effected your communication with any of the following?

Colleagues at your institution or organization.

(Checklist- Increased, Decreased, No Change)

INCREASED CONNECTIVITY

There are many indications that the use of EIES expands the size and density of social networks. By size, we mean the total number of persons with whom one is directly or indirectly in contact, and with whom one can fairly easily exchange information and ideas or more personal communications. By density, we mean the number of connections within the social network. Density is defined mathematically as the actual number of ties among pairs in a network divided by the total possible number of ties between pairs. So, for instance, a density of .50 would mean that half of the pairs in the social network or group are connected. Another concept is intensity or multistrandedness of relationships. There are many kinds of ties, from knowledge or awareness of one another to close personal friendship. It is hypothesized that systems such as EIES can increase the intensity or strength of ties as well as the size and density of networks. Such large, densely knit networks with many rich (multi-stranded) relationships are potentially a very fruitful social setting for scientific progress or other kinds of "knowledge work."

In Table 7-10, we see the only questionnaire data available for all groups on EIES measuring growth in social networks. We see that most EIES users report that they have actually met and gotten to know other scientists over EIES. As would be expected, the number of new social ties established on EIES is highly correlated with the amount of time spent on line. Among those who had spent 100 hours or more on line, a third had expanded their social/scientific network by

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eleven or more new persons.

In an analysis being carried out by Ronald Rice, we will look at changes in size and density of social networks on EIES over time by using the who-to-whom data for messages sent. Until that is completed, the only other direct measures we have (other than qualitative reports of greater connectivity, described below) are from a detailed study of one of the EIES groups (35, social networks, not by chance), carried out by the principal investigator for that group and his coauthor/wife.

Table 7-10

Number of Persons Met on EIES, by Hours on Line

Hours	None	1-5	6-10	11 or more	N
1-19	52%	35%	10%	3%	29
20-49	27%	37%	17%	20%	30
50-99	20%	48%	20%	12%	25
100+	6%	50%	11%	33%	18
All	28%	41%	15%	16%	102

Source: Post Use Questionnaire

Chi square= 23, p=.03

gamma= .38

Question... Of these, how many have you "met" (gotten to know) over EIES?

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The Group 35 Social Networks Study

Twenty-nine members of this group completed an on-line version of a social networks questionnaire at the start of the experimental period, and a mailed version seven months later. An interesting aspect of this study was that 21 of the 29 had attended a two-day face to face meeting just before they completed the first questionnaire. Thus it is somewhat amazing that a little less than half reported ever having "met" one another.

There were four types or levels of intensity of relationship asked for at the two points in time. Each participant was asked to designate those they had heard of or read publications by; those they had met, or exchanged letters or phone calls or computer conferenced with, those whom they considered "friends," and finally, those whom they considered "close personal friends." Table 7-11 shows the density for these four levels of relationships at the two points in time. As the Freemans summarize the results,

> The data for the second questionnaire show a considerable amount of consistent change. There were noticeable increases in the proportion of people reporting relationships of all four kinds. It would seem that the computer conference, or perhaps some other events that took place during that seven month period, brought these people closer together (Freeman and Freeman, 1980, p.80)

The analysis also goes on to measure distance or "reachability" among Group 35 members. A person is reachable if one is linked directly or indirectly through several ties (such as friend's friend). Distance is the number of links required to reach someone by the shortest route. For example, my friend is one link away, my friend's friend is two links (or d = 2) away. They found that the number of reachable pairs grew whenever possible (when it had not already reached 100% for the 812 possible pairs), and that the distances were shrinking on all relationships except those of close personal friends. The Freemans conclude that the network was changing from a clique structure to a genuine community (ibid):

> For close personal friends, data from the first questionnaire seemed to show the presence of tight little cliques; by the time of the administration of the second questionnaire there were many more personal friends reported and they were beginning to be loosely linked together into larger structures. This suggests that at the end of the second questionnaire there was much more of a "community" among these social networks people.

Table 7-11

Density of Four Types of Social Relations Before and After Seven Months of Using EIES, Group 35

	TIME	
Relation	First	Second
Heard of	.62	.77
Met	.49	.68
Friends	.14	.22
Close friends	.05	.06

Source: Freeman and Freeman, 1980, p.79

Table 7-12

Average distances between reachable pairs and number of reachable pairs for four relations at two times, Group 35

	TIME			
	FIRST		SECOND	
Relation	Distance	No. of Prs.	Distance	No. of Prs.
Heard of	1.38	812	1.17	812
Met	1.52	812	1.30	812
Friends	2.76	728	2.18	812
Close friends	2.01	96	3.13	221

Source: Freeman and Freeman, 1980, p.81

IMPACTS ON THE WAY IN WHICH MEMBERS THINK AND WORK

An open-ended question probed the extent to which the use of EIES had "any impacts on the way in which you think and work, in general." Respondents were asked to check yes or no, and then to "describe these impacts in as much detail as possible."

Overall, 52% report general impacts on working patterns, with many describing them (see Table 7-13). There are no significant differences among the specialty groups, with the proportion reporting such general impacts ranging from 40% in Group 30 to 71% in Group 54.

The descriptions of general impacts on the way in which members think and work fall into four broad, somewhat overlapping categories. One has to do with broadened professional perspectives or activities. The second relates to increases in communication or connectivity. The third refers to a kind of change in perspecive about the relation of self and cosmos caused by the communications medium: disappearance of space and time are frequently mentioned aspects of this. And the fourth relates to specific work habits, such as being more organized, working at home more, and increased pace of work.

General Impacts by Time on Line

As would be expected, impacts on the way one works and thinks are more likely the more one uses a system such as EIES. Reported impacts increase steadily from 39% of those with less than twenty hours total experience on line to 78% of those with 100 hours or more of on-line time.

Table 7-13
Impacts on the Way Users Work and Think
(Quotes from an Open-Ended Post Use Question)

A. Broadened Perspectives

It has broadened my perspectives on my own work and on the environment in which I am working. I have been exposed to ideas which I would not otherwise have encountered and have been able to participate in more wide-ranging discussions than ever before. I will miss the intellectual stimulation, the diversity of ideas, and the immediacy of communication.

Much more opportunity to discuss basic intuitions, perspectives and opinions on what is valuable in this field of research. My own work has broadened a great deal as a result.

I have been exposed to (1) a variety of people in my research area previously unknown to me (2) people in other research areas and their ideas about the world (3) I have been able to ask for help from leading members of my research community about current research problems.

It has made me more aware of the issues which some people in the field consider important; this has included some surprises.

Broader exposure to ideas. More aware of controversy within disciplines. Familiarity with people in field.

The world is larger than I thought-- positively in that there are actually knowledgeable people out there and (temporarily) negatively in that there are so many with so many ideas -- that (temporarily) coherence and holding onto who I am suffer a bit.

EIES has provided a richer VARIETY of information for greater awareness of universal/common experiences of work done here. New directions for future programming

I have become better informed about the details with which individuals in an ancillary discipline are concerned.

B. Increased Communication and Connectivity

My first reaction now is to get on the system and get in touch with the appropriate person. I have been doing more communicating.

More informal contacts

The instantaneous feedback capability of EIES in producing written material has had an outstanding effect on my work-- being on EIES and chairing a conference were very exciting to me. Because of my age and my pre-PH.D. status, I'm sure I would not have had similar opportunities for several years. The non face-to-face aspect of EIES enabled me to present myself and my ideas alongside those of experts in the field. I am very grateful to NSF for this experience. cent Table 7-13, cont.

Forced me to be more aware of and take into account the work of a handful of social networkers whose work is related to mine.

I am more aware of many facets of scientific communication and have thought much more about information exchange.

I am generally more aware of people out there who are at least in sympathy with my broader research area.

I can kick ideas around among a larger circle of researchers.

I have become addicted to instant gratification of need to communicate. I communicate more often on both important and trivial matters.

C. Less Space and Time Bound

Feel less time-bound

Being on EIES is like being in another space-time. I feel like I am simultaneously in France and in the States, which has been a longstanding dream of mine.

Sense of communication potential without time and space bounds. Expectation of the unexpected increase. EIES enhances sense of value to be gained from spontaneous orders (see "Cosmos and Taxis", F.A. Hayck).

If I have a tough question and little time to answer it, I'll ask people on EIES for opinions-- usually get one or two good responses.

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Table 7-13, cont.

D. Work Habits

I spend 1-3 hours per day on EIES, usually in the morning, often on weekends and at night. It has become "essential" to me.

Greater appreciation of ASYNCHRONACY in interpersonal communication... better time management in other non-EIES activities.

I've noticed that trying to keep track of half a dozen conferences has forced me to become more organized in handling messages and general correspondence on EIES.

More time given to networks. More time given to reacting/interacting with others, over EIES.

I have subdivided my work more. EIES is one element.

It is a little easier to justify working at home to myself, since the terminal is there. I can be at home and "at the office" at the same time.

I have had to learn to accept and live with what I previously would have felt was massive information overloading. I have become better at scanning and much better at being precise myself, out of my recognition of the general feeling of information overloading that is perhaps the strongest impact of entry into "The Network Society".

Need to organize information more efficiently. I structure my work using files on local (UNIX) operating system.

EIES is (slowly) forcing me to be "more aggressive- i.e. more on-line real time BEHAVIOR! (Less day-dreaming- more action!)

The speed and pace of my work has increased due to quick feedback and ideas from EIES.

Using computer-mediated text editing, message services, and teleconferencing daily in my work. Local systems, national and international systems.

More aware of importance of good communications. Also more aware of need to screen out unwanted communications. As an EIES PI, I do more and more of my work and professional communications via EIES.

Because of access to others, I can preview ideas more quickly than before.

Table 7-13, cont.

E. Other

I feel, and therefore act, more professional (a Ph.D candidate)

I have used the computer conferencing idea as one alternative for proposing structured group interaction on complex policy issues. The EIES experience has made me more aware of the pragmatic difficulties of implementing such a scheme.

It has reinforced some of my own "germinating" ideas.

Very much in favor of further development of teleconferencing.

EIES has allowed me to refine my thinking in previouly unclear areas.

The potential is there, but a hard copy terminal is very frustrating to work with. A CRT is most important for scanning purposes. If I had a CRT, I would be using EIES a lot as a word processor and it would increase my output by a lot.

Provided a means of "assured" message delivery not always provided by letter or phone.

More scientific models in therapy

Makes you realize how comparatively outdated conventional communication methods are.

IMPACTS ON PRODUCTIVITY AND EFFECTIVENESS

Tables 7-14 to 7-19 show the distribution of total responses to post-use questions which probed subjective perceptions of various aspects of the way in which EIES might have contributed to short or long-term scientific productivity or effectiveness. One cannot take such reports at face value; the respondents may have been overly generous towards EIES and inclined to see improvements in their own work where more objective third parties would not. On the other hand, the nature of intellectual work is such that only the person doing it is in a position to say whether something has helped or not.

First of all, we note that the system is somewhat more likely to be associated with increases in perceived quality of work than with quantity of work. The ways in which quality is improved can be implied by reports of specific effects such as increasing the "stock of ideas," providing leads and references, and improving conceptual understanding. The latter refers to shared conceptual space: improved understanding of the nature of work being done by one's peers and increases in their familiarity with one's own work. These effects are reported by about half of all users. The largest percentages of reported productivity-related gains occur for increasing the stock of ideas and for providing leads, references, or other information.

Professional Advancement

A separate class if items asks about professional advancement (Table 7-19). There is little difference in perceived impacts in the long term vs. the short term. But note an implicit tension between general scientific status and advancement within the specific organization by which one is employed. On the local organizational scene, one's connectivity to a national scientific network is apparently frequently perceived as damaging immediate advancement. Anecdotal evidence from users indicates that some employers deeply resent these organizationally external contacts and efforts, and occasionally even try to deprive the employee of access.

In terms of perceived "payoff" from EIES, another question shows that about 40% feel that they receive more than they put in and another 38% feel that their "payoff" is about equal to their contributed effort.

Table 7-14

Whether EIES Has Improved Quality of Work, by Time on Line

Hours	Strongly Agree or Agree	Neither	Disagree or Strongly Disagree	N
1-19	28%	28%	45%	29
25-49	24%	32%	44%	34
50-99	44%	28%	28%	25
100+	68%	21%	11%	19
All	37%	28%	35%	107

Chi square= 13.5, p=.04
Gamma= .37
Source= Post Use Questionnaire.

Question: Use of EIES has increased my productivity in terms of the QUALITY of work recently completed or underway

(Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly disagree)

Table 7-15

Whether EIES has Improved Quantity of Work, by Time on Line

Hours	Strongly Agree or Agree	Neither	Disagree or Strongly Disagree	N
1-19	24%	17%	59%	29
20-49	15%	38%	47%	34
50-99	28%	40%	32%	25
100+	53%	26%	21%	19
All	27%	31%	42%	107

Chi square=14.4, p=.03
Gamma= .35
Source= Post Use Questionnaire

Question: Use of EIES has increased my productivity in terms of the QUANTITY of work recently completed or underway

(Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly disagree)

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Table 7-16

Whether EIES has Increased "Stock of Ideas" for Future Work

Hours	Strongly Agree	Agree	Neither	Disagree or Strongly Disagree	N
1-19	10%	55%	7%	28%	29
20-49	15%	41%	15%	29%	34
50-99	20%	64%	0	16%	25
100+	32%	58%	5%	5%	19
All	18%	53%	8%	21%	107

Chi square=13.3, p=.15
Gamma= .32
Source= Post Use Questionnaire

Question: Use of EIES has increased my "stock of ideas" that might be used in future work.

(Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly disagree)

Table 7-17

Whether EIES Has Increased Familiarity with One's Work

Hours	Strongly Agree or Agree	Neither	Disagree or Strongly Disagree	N
1-19	48%	34%	17%	29
20-49	48%	30%	21%	33
50-99	44%	44%	12%	25
100+	84%	16%	0	19
All	54%	32%	14%	106

Chi square= 10.9, p=.09
Gamma= .26
Source= Post Use Questionnaire

Question: EIES has increased the familiarity of others with my work.

(Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly disagree)

Table 7-18

Whether EIES has provided Leads, References, or Other Information

Hours	Strongly Agree	Agree	Neither	Disagree or Strongly Disagree	N
1-19	28%	41%	14%	17%	29
20-49	24%	49%	12%	15%	33
50-99	16%	72%	0	12%	25
100+	58%	37%	5%	0	19
All	29%	50%	9%	12%	106

Source: Post Use Questionnaire

Chi square=17.6, p=.04

gamma= .28

Question: EIES has provided me leads, references, or other information useful in my work.

Table 7-19

Impacts on Professional Advancement

Participation in EIES contributes to:

Short term professional advancement in terms of my current employment

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
6%	25%	30%	26%	15%

Short term professional advancement in terms of my status among my peers in my specialty

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
7%	35%	37%	13%	9%

Long term professional advancement with respect to employment

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
3%	29%	37%	19%	13%

Long term professional advancement with respect to my status among my peers in my specialty

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
7%	35%	39%	12%	8%

Productivity Impacts by Specialty Group

The specialty groups do vary in their perception of the extent to which EIES increases the overall quality of their work. As would be expected from other measures of satisfaction with EIES, Group 40 is the most positive. (See table 7-20.)

Significant differences do not occur among the groups for increases in quantity of work. However, comparable data collected for Group 80, the hepatitis knowledge base project, show a reversal of the pattern of answers for the other groups. Group 80, the only task related group, has more agreeing that EIES increases the quantity of work that they are able to accomplish (nine out of twelve, or 75%) than agreeing that it has improved the quality of their work (five out of twelve, or 42%)

One might hypothesize tentatively that task related groups are more likely to report overall gains in productivity (quantity or quality of work) than non-task groups. However, it does not follow that they do not experience as much gain in the "indirect" contributions to future productivity such as general increases in knowledge or ideas or contacts. The third of the comparable items included for Group 80 is whether EIES has increased their "stock of ideas." Eight out of twelve (67%) agree that it has, which is about the same proportion that occurs for all the other groups, with the exception of Group 45, where only 37% feel that their "stock of ideas" increases.

Table 7-20

Increase in Quality of Work, by Specialty Group

Group	Strongly Agree or Agree	Neither	Disagree or Strongly Disagree	N
30	28%	33	39	100%=18
35	38%	8	54	100%=26
40	47%	33	20	100%=30
45	25%	50	25	100%=20
54	29%	29%	43%	100%=7
All	36%	30	35	100%=101

Chi square=14.7, p=.06
Source: Post Use Questionnaire

Question: Use of EIES has increased my productivity in terms of the QUALITY of work recently completed or underway.

(Strongly Agree, agree, neither agree nor disagree, disagree, strongly disagree)

Lack of Increased Publications

We do not have any reliable measures of the quantity and quality of material published before and after EIES use. One might gather such data in the future by examining citations to their published one year before they began using the system and several years after their use of the system, since a duration of several years' lag time for citations to that work will be will be necessary.

We do have subjective reports by the scientists for the number of works of various types (articles, papers, text books, other books) "currently under way" and "published during the last year," at pre use and at post use. Such data are undoubtedly rather unreliable, but one would expect, given the subjective reports of increases in factors related to productivity, to also see a general increase in the numbers of publications reported. This does not occur; some counts go up, some go down, and most show no significant differences. The one item for which there is a significant change actually shows a decrease, from a mean of 2.6 to a mean of 1.6 papers "currently underway." (T= -2.08, p= <.05, N= 80). There is not a sufficient number of cases to break these reports down by time on line or group. However, this negative finding does point up the problem of accepting at face value reports of productivity-related benefits. It is not possible with any of the available data to determine if in fact there is any objective increase or decrease in the quantity or quality of work accomplished as a result of system use. It is certainly possible that productivity could actually be decreasing, if we had an objective measure. The active users spend a lot of time on line, and perhaps they would accomplish more if they spent more time directly producing and less time communicating. Certainly, a high priority objective for future case studies is to develop more objective productivity measures, to see if the subjective impressions of increased productivity reported by heavy users of such systems can be substantiated.

MULTIVARIATE ANALYSIS

How do the various relationships that we have fit together into a causal process?

Our first step is to construct an index that combines several of the dimensions of subjectively perceived increases in productivity. We will then build a model of the determinants of such productivity increases as a result of system use; a model which is limited by the variables on which we have data, but which is a useful first approach to understanding the processes that occur.

Seven separate questions on productivity-related factors are combined to form our index of the amount of perceived productivity increases. These seven questions are all highly intercorrelated, and a factor analysis shows that there is only one underlying factor or dimension-- in other words, they are all measuring different aspects of the same thing. Our variable is called PRODUCTIVITY for short, and is formed by adding together the response scores (from one to five, strongly agree to strongly disagree) on the following items:

QUALITY= "Use of EIES has increased my productivity in terms of the quality of work recently completed or underway."

QUANTITY= "Use of EIES has increased my productivity in terms of the quantity of work recently completed or underway."

IDEAS= "Use of EIES has increased my 'stock of ideas' that might be used in future work."

RELATE= EIES has changed my view of how my own work relates to that of others in my specialty."

INFO= "EIES has provided me leads, references, or other information useful in my work."

FAMILIAR= "EIES has increased the familiarity of others with my work."

UNDERSTAND= "EIES has changed my understanding of the interests and/or activities of others in my specialty."

A stepwise multiple regression was done using the three variables identified which individually correlate most highly with both the items in the index and the productivity index as a whole. These are:

TIME ON= Cumulative number of hours on line at post-use

# COMM= "How many different people do you feel that you are actually exchanging information or communicating with on this system, currently?"

EIES MET= "Of these, how many have you 'met' (gotten to know) over EIES?"

The results are shown in Table 7-21. We see that the most important determinant of subjective judgments of a productivity increase as a result of EIES use is how many new people one is communicating with on line whom one actually met through the system. Hours on line and the total number of persons whom one is communicating with also make significant contributions. Together, these three variables have a multiple correlation with perceived productivity increase factors of .54, meaning that they explain 29% of the variance.

Our next step is to try to extend this analysis backwards to join with earlier analyses of determinants of amount of use of the system to form a model of the entire process which occurs on EIES. A PATH

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analysis was used for this purpose (See Duncan, 1966 and Kim and Kohout, 1975). A series of univariate and multi-variate regression analyses are done to determine the strength of the relationships among the factors, which are shown in the diagram in the form of the standardized regression coefficients (Beta).

The model starts with our best predictors of amount of use of EIES (see chapter two--- these are the number of EIES members known before using the system, and our conglomerate measure of pre-use motivation and attitudes and personality factors-- the estimated number of hours that will be spent on line each week).

The variables in the middle of the model are hypothesized as intervening factors with both direct and indirect causal links to the Time 1 (pre use) variables and the Time 3 (post use) outcomes. For instance, estimated hours on line has a weak but significant relationship with the number of people met on EIES. Time actually spent on line has both a direct effect on increased productivity, and an indirect effect. Time on increases the number of persons met on line, which in turn is our strongest predictor of productivity increases. The number of persons met on EIES also increases the total number of persons being communicated with on line, which is another direct determinant of productivity.

Not all of the possible indirect links are shown, either because they are considered theoretically unimportant or unlikely and/or because empirically the causal link has no evidence. For instance, one might think that perhaps the number of persons met on line is affected by the number known before use, since one could be introduced to new acquaintances by old ones. However, there is no significant relationship. Likewise, one might posit that time on line alone increases the number of persons communicated with, directly. In fact, there is no significant relationship (Beta= .03).

One of the weakest links in the model is the determinants of the key variable "EIES MET." Like the initial level of estimated hours on line, this is probably determined by a number of unmeasured motivations and personality factors. There are hundreds of potential new colleagues on line on a system like EIES; all members have an equal opportunity to communicate with each other; yet some take advantage of this opportunity and some do not. Those who do meet many new people on line are likely to be happier with the system (see Chapter five) and to perceive significant productivity increases in their work. What determines the number of people whom one will reach out to meet and communicate with on a system like this is a process worthy of detailed study.

Table 7-21

Determinants of Increased Productivity: A Stepwise Multiple Regression

(Note: see text for definition of variables)

FACTOR	MULT R	R SQUARE	BETA
EIES MET	.47	.22	.39
TIME ON	.54	.29	.25
# COMM	.54	.29	.05

F=13.2, p< .01

N of cases=101

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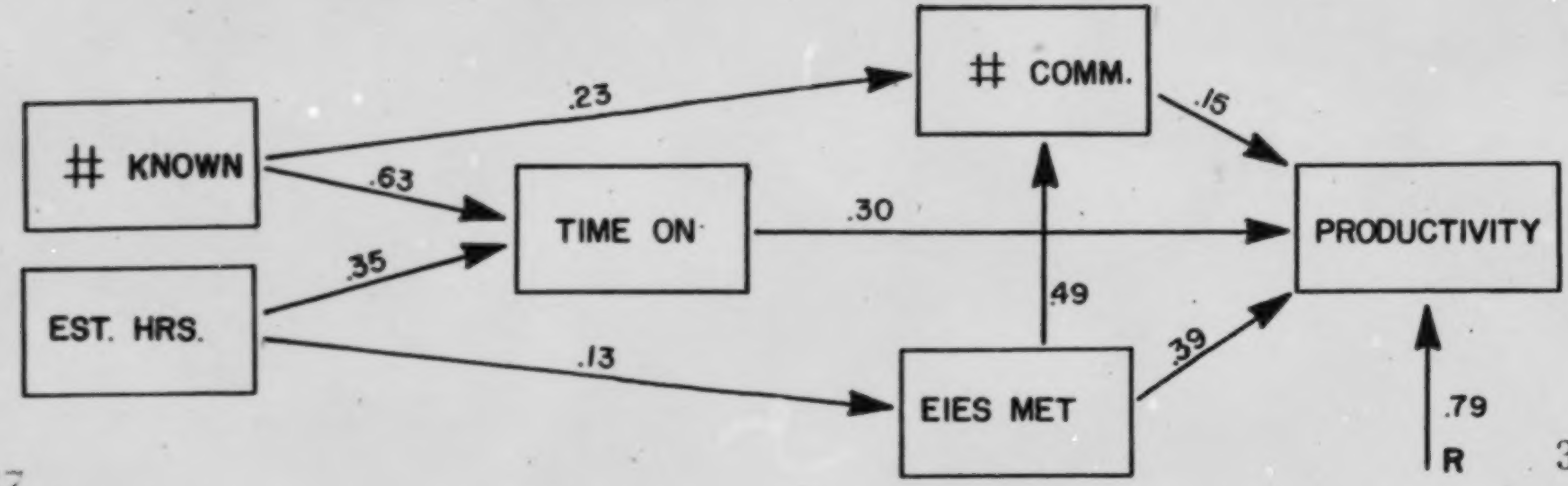

# KNOWN
EST. HRS.
TIME ON
# COMM.
EIES MET
PRODUCTIVITY
.23
.63
.35
.13
.30
.49
.15
.39
.79
R

A PATH DIAGRAM OF EIES USE

(Beta Coefficients shown in parentheses)

SUMMARY AND CONCLUSIONS

In terms of effects on media use, EIES communication is most likely to be added onto other communications; but those who use the system the most are likely to also expand their use of other communications modes. There is some replacement of telephone and mails by computer-mediated communication. Travel to professional meetings and visits with other researchers are not affected for most people. Although the majority report no effect on the reading of professional books and journals, a significant minority (28% overall and 44% of heavy system users) report an increase. Communication with colleagues at one's own location is more likely to increase than to decrease.

Of course, subjective reports about the frequency of use of various media are likely to be quite unreliable. However, we did not ask for acurate counts, but only for gross changes: up, down, or about the same. Overall, there is a tendency for the media to add on to other modes and channels of communication, rather than to substitute for them. Previously established scientific and professional networks, maintained by other forms of communication, persist along side of the new, larger, more widespread computer-mediated network.

Nourished by this additional communication in a new form, various measures of social ties show strengthening. New ties are established on the computer network, and some of the new professional colleagues become personal friends as well as coauthors or collaborators. In social network terminology, the community becomes not only larger but more densely knit.

The majority of EIES users report some general impacts of the system on the way in which they think and work. Perspectives are broadened-- with exposure to more ideas, theories, scientists, and opinions. The second is the subjective recognition of the impacts caused by the increased communication with a larger network of scientists, such as the ability to get "instant feedback" on ideas and to "kick ideas around" with others when a piece of work is in its formative stage. Finally, there is an adjustment in working patterns and habits-- one to three hours a day on line fitted into the schedule of heavy users; increases in the speed and pace of work; and in feelings of information overload and the need to organize one's work more formally.

Turning to productivity, as would be expected, the more time spent on line, the more likely users are to subjectively report increases in the quantity and quality of work accomplished as a result of system use. Increases in quality of work are more likely to be perceived than increases in quantity (better reports or articles, rather than more).

Such productivity increases seem to be linked to reported increases in the "stock of ideas" with which to attack new problems, and to the availability of leads, references and other information which can be used to help in one's work.

A multivariate analysis indicates that "meeting" new people on line plays a central part in the process and outcome of system use. The strongest predictor of subjectively reported increases in productivity is the number of persons met on EIES with whom one subsequently establishes regular exchanges.

Perhaps EIES is like an intellectual lonely minds club or singles bar. People come to it hoping to expand their contacts, establish some "meaningful" communications, be stimulated by new ideas. If they do meet a lot of intellectually compatible people on line , they feel that the experience is a productive one.

CHAPTER EIGHT

COMPARATIVE MEASURES FOR MACC-TELEMAIL AND PLANET

To what extent are the observations of EIES users generalizable to other systems and other types of user groups? A limited amount of data are available to begin to answer this question.

"Theory Net", a comparable "invisible college" in the area of theoretical computer science, which used the TELEMAIL computer-mediated communication system, was studied using some of the same measures as were employed for the scientific communities on EIES. In addition, some of the measures included in this study are replications of indicators used by Robert Johansen and his colleagues at the Institute for the Future in their studies of PLANET users. Finally, we have one subjective reaction question that was used in common for NLS, TELEMAIL, and EIES (See Chapter 2 for a description of the NLS study.)

In this chapter, the Theory Net group and study will be described. Some of the available data for the Theory Net group on TELEMAIL will be presented. Then we will compare similarities and differences in the data for the various systems. If the indicators used in these studies are replicated for a few more types of systems and applications, it may be possible to determine the causes of observed similarities and differences.

THE THEORY NET GROUP

In proposing this field trial to test the use of a computerized mail system, the principal investigator wrote:

> "The theoretical computer science research community has a well developed grapevine. That is, significant interactions between active researchers in the field are already taking place over a number of alternative communication channels. This gives the opportunity in the proposed test to compare the notion of a computerized mailbox and its efficacy with already existing communication channels. The reason for the interaction within the community of researchers in theoretical computer science are twofold:
>
> 1. The community itself is made up of a relatively small number of active researchers. This means that significant interaction is inevitable since active researchers tend to know most of the other active researchers in the area.
>
> 2. Very few research institutions have what would be classified as large groups of theoreticians. Therefore, if group interactions are to take place at all - and inspection of recent technical articles in the field indicates that does take place - active groups must necessarily interact over significant distances." (Landwebber 1977:1-2)

Nine institutions, including a NSF representative, were originally included in the "theory net" group, with a total of twelve individuals. It was noted that possible activities might include "correspondence between research collaborators, the preparation and circulation of results and reports, the transmission of results to the editor of the newsletter of the theoretical computer science (SIGACT) community and communication with NSF personnel." The SIGACT editor was included in the group, and as time went on, many other members were added to the theory group.

Self-Reported Characteristics of Theoretical Computer Science As a Specialty

In estimating the age of the specialty, most respondents said 10-19 years. Eighty-eight percent of those responding reported three to ten journals relevant to the specialty area, and all reported none in which descriptions of ongoing research were available. All reported a "must attend" yearly meeting of the theoretical computer science specialty. There was also unanimity that there is an "intellectual mainstream" in the specialty, and all of the Theory Net participants felt they were "in" the mainstream. Competition is generally perceived as moderate and mainly attributed to the high achievment drive of some of the members of the specialty area and to competition for funds. There were no reports of strongly opposing theoretical viewpoints or of unethical competition.

The picture which emerges is thus of a somewhat more mature specialty area than was typical of the research communities on EIES. This is reinforced by the reported preference for working in "established areas." In terms of basic values, however, they lean towards emotional committment rather than neutrality, and particularism rather than universalism, just as do the groups on EIES. The scientists themselves are rather young; most are under 35. All have Ph.D's. They do not write books in this highly mathematical field, but they were working on an average of five journal articles and almost all published one or more articles the preceding year. They had spent most or all of their scientific careers in the specialty. Most consider themselves to be in the middle to higher range in terms of professional reputation within the specialty. As computer scientists, all were of course very experienced in the use of computers and terminals before using the TELEMAIL system, and had favorable attitudes toward computers. However, on the basis of their previous experiences, they tended not to trust computers for the storage of paperwork used daily. They anticipated using the system only for private messages and reported that they were strongly motivated to use the system.

THE MACC - TELEMAIL SYSTEM

The TELEMAIL system (later named @MAIL, when TELENET took over the right to use the name TELEMAIL) provides the ability to send items such as memos, drafts of working papers, and computer program source listings or data to other "addresses" or "mailboxes." It is resident on the Univac computer at the University of Wisconsin, Madison, and accessible through the TELENET network. Its design was influenced by that of other computer-based message systems, particularly HERMES. It has a simple set of commands that suffice for the beginner:

```
EXPLAIN
STATUS
PRINT
TO
MAIL
DELETE
EDIT
QUIT
```

There are also more complex features, such as the file system, "filters," and a separate EDIT system. (Academic Computer Center, The University of Wisconsin - Madison, 1975, 1977. Updated manuals are now available. These are the versions originally supplied to Theory Net members.) The "mail" metaphor pervades the system, with "postmarked" dates and even a "Post=Master," the "mailbox" to which questions can be sent. Note that in order to edit, a user must enter a separate edit system when the message is finished, then re-enter the MAIL system when the editing is done.

The user interface includes conventions peculiar to UNIVAC, with the use of asterisks, periods, and such to name subfiles. For instance, a sample command is:

```
COPY SOURCECODE*FORA.PROGRAM to JIMMY=CARTER
```

Such a copy command must be used after an edit, before a message can be sent. As a result, as we shall see, many Theory Net members avoided the editor.

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METHODOLOGICAL DIFFICULTIES

The Theory Net Group communicated almost entirely by private messages. It was therefore not possible to observe their behavior or to become accepted as a neutral and sometimes helpful observer, as in EIES. An attempt was made to gain rapport by setting up a group file, which could act like a conference. There, a plea was made for copies of the material being sent among members of the group, so that it could be analyzed. One person cooperated by sending some sample messages; everyone else ignored it.

A second source of data, summary monitor statistics on amount and type of use, was not available for the MACC system. Accurate measures of the dependent variable had to be abandoned. There are only subjective estimates from some of the participants on the amount of time spent on line each week at the time of follow up.

Questionnaire data are sparse and incomplete. This group started very small, and was frequently added to. Unlike the arrangement with the EIES staff, a copy of the pre-use questionnaire was not automatically sent to each member as he/she was added. We therefore have very incomplete "pre-use" data; it includes only the original core group of members. There were eight responses to the pre-use questionnaire, which was sent out in the early fall of 1978. There was no obvious point at which to send follow-up questionnaires; at about the 3-6 month point, when they had been sent for EIES, there were plans for the Theory Net group membership to be greatly enlarged, and it thus seemed premature to do a follow-up. Thus the follow-up was actually administered at a point in time (Spring, 1980, at approximately eighteen months) equivalent to the post-use questionnaires for EIES, and no comparable post-use measure was taken. There were 22 follow-up responses from the expanded Theory Net group.

Finally, the study suffered from inadequate contact with the principal investigator and no face to face contact whatsoever with any of the group members. The EIES groups were clustered on the East Coast, and it was easy and inexpensive to visit with the principal investigators and other key members from time to time, particularly since many of them came to Newark to talk to the EIES staff. Wisconsin was a long, expensive journey from Newark.

Many of these problems could have been alleviated with an intensive investment of time and travel funds; however, such resources were simply not available within the modest funding levels for this project.

In looking at comparable data for Theory Net on MACC-TELEMAIL and for the EIES groups, any differences or similarities observed can be interpreted as supportive of hypotheses, but not as proving or disproving hypotheses. There are too many differences in the nature of the subjects studied, the systems used, and the timing of the data collection, plus poor response for the Theory Net group, to rule out many alternative explanations for any similarities or differences. No statistical tests of differences between the two sets of data will be made, since the data themselves are not fully comparable.

MACC-TELEMAIL: QUALITATIVE DATA ON USES AND REACTIONS

Table 8-1 shows the reported uses of MACC-TELEMAIL by the Theory Net group. Generally, the system was used only for private messages. A few small groups of two or three used files to coauthor papers or to coordinate joint research.

The comments in Table 8-2 indicate some general dissatisfaction by the computer-sophisticated with the system. The editor is the source of much criticism, and there are some complaints that the system is "anachronistic" or not state-of-the-art as compared to other computer systems with which the group members are familiar. There are also complaints about low activity levels.

Table 8-1

Reported Uses of MACC-TELEMAIL

Note: These comments are taken from any or all of the following questions:

-- What are the main activities you have been engaging in on the system, and with whom?

-- Are there any ideas that you are using or working with at present that you first learned of on the system?

--Are you working on any projects or papers at the present time that have been advanced by your use of the system?

-- Are you coauthoring or collaborating closely with any members of your group at the present time, using the system?

-- Are there any new uses you have invented for the system that are helping you in your work?

--What tasks or activities can you suggest for your group on the system in order to motivate participation?

1. Short mail messages to coordinate research papers and/or travel with (a few) people.

2. Reports "yes" to coauthoring and working on projects on line but gives no details.

3. Uses it for inquiries about university policy and activities, recent research, and whereabouts of people, plus "general gossip and foolishness."

4. Refereeing, paper preparation and editing, correspondence related to professional conferences. Reports as a result of participation "interest in a 'universal language' for specifying mathematical notation in standard ASCII."

5.. Mail, research document preparation.

6. Reports research collaboration with one other person (described as "a very active research project").

7. "Reading a few system messages and a couple of short letters."

8. Mail activities (substituting for phone and U.S. mail). Book review column for SIGACT NEWS. Some research with one other member, exchanging ideas on future joint work.

9. Mail and research collaboration with 2 other members.

10. Coordinating SIGACT Symposium Program Committee. Mail to one other concerning research interests.

11. Simple messages, exchange of paper abstracts (2 others named).

12. Exchanging brief mail messages. Use it for messages to other department members while traveling.

13. General messages to associates. Items regarding publication of SIGACT NEWS.

Table 8-2

Comments or Suggestions about Improving TELEMAIL Features or Initiating Desirable New Features

1. The system is at least ten years out of date. Compared to a system like UNIX (just an example), the user interface is very poor. This is probably because of Univac's OS, but it seems that a really usable mail system should be built on a good OS--not just the one that happened to be available.

2. I cannot now use the system until I can have access to a 1200-baud dial-up connection.

3. Improve the file handling and text editor. It is very difficult to use in preparing and sending documents. It is also FAR too expensive.

4. Enhance the ability to write math formulae.

(Main Negative Aspects of the TELEMAIL System)

1. I have found the system unfriendly. This is very disappointing. Other mail systems are far easier to use.

I refuse to edit messages on this system because of the complexity of the process. I merely write short messages and leave the typos there.

I regret not being able to use an editor and an operating system with which I am familiar to compose text and then simply to send it.

2. My difficulty is in establishing a regular pattern of use, due to the fact that I don't have my own terminal and, hence, rarely log on. I thus do not send or receive much mail.

3. Some people do not check for messages frequently. There is no way to "prompt" them.

4. The system crashes too often.

5. Bad editor! Bad file handling!

6. This system needs to be polished in important ways.

7. Supposedly, our group is already heavily into computing. Therefore, much of this system is an anachronism.

THE PLANET DATA

Approximately 500 members of more than 18 organizations were observed, using PLANET (or, in a few cases, the related FORUM system), by Vallee et al. as part of a project conducted by the Institute for the Future. Among the organizations were NASA, the U.S. Geological Survey, ERDA, and the Kettering Foundation. The conferences lasted from 1 week to 24 months. Applications included topical conferences on food and climate, individually guided education, technology transfer, and psychic research, as well as the management and coordination of technical projects or joint report writing (Vallee et al., 1978:xv). 188 of the participants responded to a post-use questionnare. These tended to be the heavier users of the systems, with 40% of the respondents above the highest quintile in terms of number of sessions and another 30% between the highest and the second quintile (ibid:109). We thus have a very wide range of sizes and types of groups and applications, plus an unrepresentative set of survey responses. Nonetheless, comparative responses for the same post-use questions included in the EIES and MACC TELEMAIL field trials may be informative.

SUBJECTIVE RATING SCALES

Table 8-3 shows the comparable means for overall subjective satisfaction ratings for EIES and TELEMAIL. There are many similarities, such as almost exactly the same average for the overall rating of the systems as "extremely good" to "extremely bad." The means are exactly the same for "easy" to "difficult." However, there are also some interesting differences. EIES is seen as more friendly, more stimulating, and more fun. However, it is also seen as more time wasting and demanding, probably because of the much larger volume of activities on line.

DACOM Scales

The DACOM ratings of the extent to which MACC-TELEMAIL, EIES, and PLANET were satisfactory for specific communications functions (Table 8-4) yielded similar results for most items, with the exception of "getting to know someone." For all three systems, giving or receiving information and exchanging opinions were the tasks for which the highest degree of satisfaction was reported; bargaining and persuasion were among the least satisfactory for computer-mediated communication. Using a criterion of more than a point's difference between means, the only clear difference is in "getting to know someone;" for this, EIES received higher ratings. This can probably be attributed to differences in design, such as the presence of a public directory in EIES and the group vs. individual orientation of conferences as compared to messaging. Another apparent difference is that the TELEMAIL group does not seem to have

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as much difficulty with resolving disagreements on line. This is probably because of a combination of the fact that group debates are hardly ever held via messages, as compared to conferences, which are often set up specifically to find and discuss differences of scientific opinion; and because the Theory Net group studied utilizing TELEMAIL within theoretical computer science is not in a scientific community that is undergoing a lot of disagreements.

Experiences Communicating via EIES, TELEMAIL, and PLANET

Using items originally designed by the Institute for the Future for evaluation of PLANET, we can get another set of comparable measures, this time for the three systems (shown in Table 8-6). Most of the averages are very close. Users of all three systems tend to "sometimes" feel distracted by the mechanics, to "sometimes" feel constrained, "almost always" able to express their views, and, somewhere in the "sometimes" to "almost always" range, able to get an impression of personal contact with others. The only difference is that the users of the mail system less frequently feel overloaded with information than do the users of the two conferencing systems, who sometimes find a large number of items waiting for them in a large group conference.

System as Useless to Revolutionary: TELEMAIL, EIES, and NLS

An item designed by Edwards for her NLS evaluation was used for the EIES and TELEMAIL studies in order to obtain comparable measures of feelings about the usefulness of the systems and the extent to which they were potentially "revolutionary" (see Table 8-6). Remembering that dissatisfied or low-level users were least likely to complete the questionnaires, it is not surprising that, for all systems, responses are generally more positive than the "neutral" point and that users are likely to feel that their system has at least "certain worthwhile uses." The only clear difference seems to be in the extent to which users feel that the system is "revolutionizing" their work and communications. This is not at all as frequent an evaluation for the simple mail system as for the more complex systems designed to support a wider variety of communications and work functions.

Table 8-3

Overall Reactions to MACC-TELEMAIL and EIES

Means (7-point scales; 1= Highest rating)

Item	TELEMAIL	EIES
Extremely good-extremely bad	2.9	2.8
Stimulating-boring	3.9	2.5
Productive-unproductive	3.1	3.3
Great fun-unpleasant work	3.9	2.7
Time saving-time wasting	2.3	3.7
Not frustrating-frustrating	3.9	3.9
Friendly-impersonal	3.9	2.7
Easy-difficult	2.9	2.9
Not demanding or intrusive-very demanding or intrusive	1.4	3.4

Sources: MACC-TELEMAIL Follow-Up Questionnaires (N = 22)
EIES Follow-Up Questionnaires (N = 111)

Table 8-4

DACOM Scale Measures - MACC-TELEMAIL, EIES, and PLANET

Means

Function	TELEMAIL	EIES	PLANET
Giving or receiving information	2.0	2.4	2.1
Problem solving	4.0	3.9	3.4
Bargaining	4.4	4.1	4.2
Generating ideas	3.8	2.8	2.6
Persuasion	4.3	4.2	4.6
Resolving disagreements	3.5	4.1	4.3
Getting to know someone	4.8	3.3	4.5
Giving or receiving orders	3.2	3.2	2.4
Exchanging opinions	1.9	2.3	2.1

Sources: Theory Net Follow-Up Questionnaires (approximately 18 months; N = 22)
EIES Post-Use Questionnaires (approximately 18 months; N = 102)

PLANET: Computed means to nearest .1 from raw data included on p. 183 of Vallee et al., 1978. Scale reversal used to obtain comparable values.

Questions: How satisfactory do you think the system is for the following activities? (1 = completely satisfactory, 7 = completely unsatisfactory)

Table 8-5

Experiences Communicating via TELEMAIL, EIES, and PLANET

Means

Feeling	TELEMAIL	EIES	PLANET
Distracted by the mechanics of the system	3.3	3.1	3.2
Constrained in the types of contributions you could make	3.1	3.2	3.6
Overloaded with information	4.1	3.0	3.6
Able to express your views	2.1	2.1	2.0
Able to get an impression of personal contact with other participants	2.2	2.6	2.6

Source: EIES Follow-Up Questionnaire, N = 110

TELEMAIL Follow-Up Questionnaire, N = 22

PLANET means computed from raw data reported on p. 182 of Vallee et al., 1978.

Question: Thinking back over your experiences with the system, how frequently have you felt... ("always = 1, "almost always" = 2, "sometimes" = 3, "almost never" = 4, "never" = 5)

Table 8-6

Overall Ratings of Systems as Useless to Revolutionary:

EIES, TELEMAIL, and NLS

	EIES	TELEMAIL	NLS
I think it is useless and should be discontinued.	0	0	1%
I think it has its uses for others, but not for me.	4%	0	1%
I am skeptical but am giving it a try.	8%	0	5%
I am basically indifferent or neutral.	0	0	3%
I think that it has certain worthwhile uses for me.	41%	47%	22%
I think it is very useful in many respects.	31%	47%	44%
I think it is revolutionizing my work/communications processes.	17%	5%	23%
Total	100%	100%	100%
N	107	19	94

Question: Which statement best describes your present reaction to ...

Sources:

EIES: Follow-Up Questionnaire

TELEMAIL: Follow-Up Questionnaire

NLS: Post-Use Questionnaire (Edwards, 1977, p. 105)

SUMMARY

Much early work in anthropology fell into the category of "ethnography": the description of a single society. Later, as this descriptive material accumulated, "ethnology," or the comparison of similar institutions across societies, became possible. A priority for future research on computer-mediated communication systems should be sufficient standardization of the types of data collected and the measurement instruments used so that an "ethnology" of computer-mediated social systems becomes possible.

Based on the limited comparative data available, there is a great deal of similarity in user ratings of the characteristics of the four systems covered in this chapter (EIES, PLANET, NLS, MACC-TELEMAIL), despite many differences in system design. The main difference seems to be between the simple message system (MACC-TELEMAIL) and the more complex systems. The simple mail system is less "friendly," less fun, less stimulating, less useful for "generating ideas," and overall, less "revolutionary" in its impacts on users. On the other hand, it also takes much less of its users' time, is felt to be less demanding and intrusive on them, and less likely to overload them with information.

CHAPTER NINE

SUMMARY AND CONCLUSION

If you were reading this report on your terminal, you could at this point loop back to review the highlights of each chapter, skimming concise topic descriptions and deciding if you would like to read a fuller summary of each point. With a linear text, this is not possible. The closest equivalent is to simply raise the main points which have been made.

1) Methodological Problems

a) The design of the study postulated a fixed group of scientists using a specific computerized conferencing system for a period of eighteen to twenty-four months, with objective behaviorial and subjective attitudinal data collected at several points in time. In reality, a constant turnover in group membership occurred. This combined with steady changes in the nature of the system, and non-response on questionnaires to give us incomplete data for most participants. As a result, for analytical purposes, the data can be treated for the most part only as several cross-sectional surveys rather than as longitudinal panel data which is more amenable to causal hypotheses.

b) Unknown Generalizability

The scientific communities were not representative of all scientific research communities, but tended to be fairly new and cross-disciplinary areas. In addition, there was considerable self-selection within the communities, both in regard to initial invitations/agreement to participate and in amount of actual use made of the system. Finally, we do not know to what extent the scientists are similar to other professional and technical people.

2. The strongest predictors of acceptance of a computerized conferencing system are attitudinal and motivational variables rather than any "objective" characteristics of users, such as previous computer experience or typing ability. Such variables include expectations about how useful the system will be and how many people one knows who will be on line.

With self-activated learning, as occurred with EIES, those with poor initial expectations of the usefulness and importance of communication with others via the computer system are likely to never sign on at all or to lack the motivation to remain through the learning period. The very high drop-out rate among invited users is a serious problem for the future of computer mediated communication systems.

3. User group is an important contextual variable. The same system is likely to be perceived as having good or bad software features and as being a productive or an unproductive means of working with others, as a function of group membership. Group membership includes such variables as whether or not there is effective leadership and the nature of the task the group is

working on.

4. There is a process of "evolution" in user behavior, whereby more experienced users change their preferred mode of interaction from passive menu selection to active command definition, expand and change the nature and number of features in a computerized conferencing system which they consider necessary and useful, and expand the range of communications functions for which the medium is seen as satisfactory.

5. Those who do get through the learning period and actually participate in group communications tend to rate the system positively in terms of such characteristics as being easy, fun, and productive. They also tend to endorse specific design choices that were made in the EIES system, such as forced delivery of private messages (inability to reject them before they are ever printed out) and a progression of levels of interfaces whereby users begin with menus. The strongest predictor of subjective satisfaction with the system is the extent to which it has expanded social networks through facilitating "meeting" and working with new colleagues who share one's interests.

6. The scientific communities tended to report that there were as a result of use some clarifications of theoretical controversies in the field, an increase in total communication within the specialty, and an increase in contacts across disciplines or specialties. There were no decreases in communication with off-line colleagues as a result of system

use.

7. Subjectively perceived increases in "quality" of work as a result of system use are more frequently reported than increases in quantity of work performed. Exposure to a broader range of information and ideas than otherwise possible, and the availability of a much larger network of people who may be helpful when one does want information and assistance with a specific project are among the benefits that are seen as increasing productivity. In terms of media substitution, there is some decrease in telephone and mail use as a result of substituting computerized conferencing, but no decrease in travel or in reading of professional books and journals.

8. Even though there were many differences among groups, applications, and systems, results for several measures of subjective satisfaction replicated on EIES, MACC-TELEMAIL, PLANET, and NLS are for the most part very similar. This implies that there are some general characteristics of all computer mediated communication systems in terms of user reactions.

Tentative Conclusions

The above points are simply a review of conclusions for which data have been presented in the preceeding chapters. Comparing the experiences and the degree of success of the various EIES groups, the following kind of tentative conclusions emerge:

1. Learning to use a new medium of communication and to effectively integrate it into one's work patterns is no simple, easy matter. Although EIES members could learn the basic mechanics of using the system in a few hours, they did not become fully comfortable with it and able to utilize some of its potentially most useful features, such as joint document production, until fifty to one hundred hours of experience.

2. If a user group does not have one or more persons willing to take the responsibility for an active leadership role, spending on the average an hour or more a day on line to organize and stimulate the interaction and task coordination, an application is likely to be a failure.

3. Participants should feel that the task or activity in which they are engaging on line is important enough so they are willing to MAKE TIME to spend at least an hour a week on line. Less regular participation leads to frustration for group members when messages are not picked up and responded to, and for the user constantly forgetting how to use the system and never becoming proficient and comfortable with it.

5. Groups like to be able to jointly develop some special structures or commands to help them in their particular tasks. This theme will be treated more fully in a subsequent report.

6. There were no dramatic "scientific revolutions" in the sense of new paradigms emerging during the eighteen to twenty-four months of observation. However, there was progress towards the

> clarification of theoretical controversies in most groups. Most importantly, there was an expansion of the professional network with which active members of the system regularly interact; and a feeling of greater awareness of varieties of work in the area and of the availability of new sources and types of information useful in scientific work, through this network.

Looking at the high drop out rate contrasted with the testimonials of the confirmed users, one wonders if perhaps CC is like religion: it only helps if you have faith that it will.

MEANING AND OBJECTIVITY: PARTICIPANT OBSERVATION AND THE RAIN DANCE

Initially, this study was designed to measure some rather limited, pre-defined impacts of a computerized conferencing system on the communication patterns, paradigms, and productivity of scientific research communities. The process of communication via computer was seen as merely an intervening variable. As the study progressed and the communication patterns were observed, however, the process of communication via computer emerged as a phenomenon worthy of study and description in its own right. Moreover, such description is likely to be generalizable to most professional and technical users of the medium. The study thus shifted in focus as it progressed, from the sociology of science to the sociology of individual and group processes in adapting to a new communications medium. In addition, it became obvious that this new form of communication had some perhaps unanticipated consequences for the participants. Even though some of the scientists wondered if the amount of time they invested in such communication in fact had any direct productivity payoffs, they continued to participate. At the same time, the detached observer became somewhat caught up in a shared belief by the members of the communities that their activities had some importance and significance for the future of scientific research, and society as a whole, even if they were not quite sure how to explain the significance.

There are parallels with the cautionary tales of Paul Lazarsfeld as he discussed the dangers of "going native" while studying the rain dance, and with the penetrating functional analysis of Robert Merton in illustrating the concept of latent functions with that very same ritual gathering. Lazarsfeld cautioned his students somewhat as follows:

> You can observe the rain dance and maintain your objectivity. You can even participate in the rain dance, and gain a subjective understanding of its meaning for participants. But when you start to believe in the rain dance---when you start scanning the horizon anxiously for sight of those dark clouds signalling that your activity is indeed going to bring rain - then you are in trouble. You have gone native.

As this study progressed, I did begin to share the belief of many of the participants that their experiences with a new technology had important consequences for the future of not only scientific communities, but also human society in general. This belief could not be substantiated with any objective evidence of productivity gains. There are only the subjective feelings of the most active participants that their electronic tribal gathering was beneficial; that if nothing else, they enjoyed it and were stimulated by it.

From the point of view of traditional functional analysis, the premise is that if a group or society persists in a pattern of behavior, then it must have some beneficial outcomes. These outcomes may be "latent functions" - neither intended nor necessarily recognized by the participants, as contrasted to the "manifest functions," those publicly announced, officially endorsed goals for the activity (Merton, 1968, p.119). In the case of the rain dance, there is no objective evidence that the amount or form of dancing affects the probability of rainfall. A parallel that struck me is that an important scientific breakthrough may be just as unpredictable as rain: hard work and trying alone may not cause it to happen; other environmental variables are a controlling factor. However, in the tradition of Durkheim (in The Elementary Forms of the Religious Life), the rain dance may have important functions for the social solidarity of the group. It brings the members of the tribe together, gives them a chance to reaffirm and clarify their shared beliefs, and creates the opportunity for new marriages and alliances. Such new alliances may indeed help the participants to better cope with their environment and engage in fruitful cooperative efforts, over the long run.

For the new class of computer-based communications systems, of which EIES is a forerunner prototype, but only a single example, it is hard to quantify those latent functions, which may be the most important in the long run. In retrospect, a period of eighteen to twenty-four months seems too short to expect to see large increases in scientific productivity of individual participants or dramatic paradigm shifts in the user community as a whole. EIES activity was, after all, only a small portion of their total professional lives and activities. For the relatively "heavy" users who spent 100 or more hours on line over eighteen to twenty-four months, this is still only a few hours a week. The most important consequences seem to this observer to be the enlarged and strengthened professional network of colleagues, the greater understanding of the work of others and how it relates to one's own; and the feelings of having been exposed to a wide variety of information and ideas that would form a permanent resource that might be utilized during the rest of one's professional life.

An emergent objective of this study thus became to describe and understand the communication activity itself, its forms and variations, and the feelings of the participants about it. As in an ethnographic study, one can gather some qualitative descriptive data by observing and participating, and some more quantitative descriptive data by surveys of attitudes and census counts of activity patterns. When we have a number of such descriptions for various computer-based systems and a variety of user communities, we will be in a better position to try to prove "cause" and "effect." In the meantime, the forms and rituals of communication via computer are at least as interesting to study as the rain dance, and potentially much more important for the future of a society which may be forced to choose cheap telecommunication alternatives in an era of scarce resources. Stretching the analogy between studying the rain dance and studying computer-mediated communications to its fullest, the rain dance may be seen as a cultural reaction to a crisis situation with which the society does not know how to deal; so may the large-scale experimentation with new computer and communication technologies.

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APPENDIX A

PRE-USE QUESTIONNAIRE
Study of the Impact of Computerized Conferencing
Upon Research Communities
(Copyright, 1977, Starr Roxanne Hiltz)

Your cooperation in completing the following questionnaire, before you participate in the system for more than an hour or so, is vitally necessary for a thorough and proper evaluation. The questions are designed to collect some information on your general background, your communication skills and style, your access to the conferencing system and your predisposition concerning its use. You should be able to complete the answers in about 30 minutes.

Directions

Most of the questions are structured so that they require only a check or a simple numeric response. Some, however, request you to list or describe items. Please type or print your response as clearly as possible. Where you do not know or cannot make a rough estimate of the answer you may leave it blank.

Notice that a continuation page has been attached to the end of the questionnaire should you need additional space to answer or clarify your response to any of these questions.

Your Name ______________________________

EIES Group Name/# ______________________________

Job Title ______________________________

Your Employer ______________________________

City ____________ State ____________

This questionnaire is voluntary and in no way conditions your participation in the system. If you have, for some reason, an objection to filling out this questionnaire, please note your objection below and return it to us. Or, if the case applies, note your objection to any single question and leave it blank.

Objection:

PRE-USE QUESTIONNAIRE

DATE FILLED IN __________

CODED ID ONLY __________

(Cover page will be removed to preserve confidentiality)

TURN PAGE TO BEGIN

370

Part I. Your EIES Group's Research Specialty (Group # ____________)

1. Please give a one sentence description in your own words of the scientific or technical specialty of your EIES USER Group. (Note: this name will subsequently be what is meant by "your specialty area"). Then describe the main problem or project on which you personally are working, within this specialty area.

Employer =

Academic	71
Govt.	4
Priv. Research	9
Business	2
Medical	3
	89

1 missing

Not recog.
8

2. What is the approximate year in which this specialty became recognized (or will become recognized) as a separate and distinct research area?

<5 = 10   5-9 = 18   10-19 = 18   20+ = 26   Tot. = 80

3. For approximately how long have you been actively working within this specialty area? ____________

<1 = 2   1-4 = 20   5-9 = 35   10+ = 29   Tot. = 86

v or 009

4. What is the total number of journals in which articles relevant to your specialty area are likely to appear?

(1)____________ none
(2)____3____ two or less
(3)____49____ 3 - 10
(4)____15____ 11 - 19
(5)____7____ 20 - 49
(6)____4____ 50 - 99
(7)____7____ 100 or more

Tot. Ans. 85

5. Is there any journal or newsletter or other published source in which you can find descriptions of current (unfinished) research activities and developments within your specialty?

(1)__27__ No

Tot. Ans.

(2)__54__ Yes: please list:____81____

6. Is there any one meeting or convention which you "must" attend in order to keep up with research in your specialty? (IF yes, please list).

(1) ___57___ No (2) ___29___ Yes (___Tot. 86___)

7. Could you list the four major or outstanding people in your entire specialty and the extent to which you know them personally and/or are in direct contact with them?

				Extent of Current Contact					
	On EIES	Not on	Tot.	Constant	Frequently	Occasionally	Rarely	Never	Tot.
a.	28	42	70	1 = 12	2 = 21	3=22	4 =14	5 =6	75
b.	24	46	70	1 =113	2 = 12	3 = 22	4 = 18	5 = 9	74
c.	25	40	65	1 = 6	2 = 13	3 = 23	4 = 21	5 = 7	70
d.	20	36	56	1 = 4	2 = 8	3 = 26	4 =11	5 = 12	61

8. How many members of your EIES User Group do you know either professionally or personally? ___Tot. 213

1-5 = 153 6-10 = 27 11-20 = 19 21-79 = 9 All = 3 Most = 2

9. Is there a commonly accepted "intellectual mainstream" in your specialty?

(1)___36___ Yes (2)___49___ No Tot. = 85

10. If yes; to what extent do you feel that you and those with whom you collaborate are in the recognized intellectual "mainstream" of your specialty, or conversely feel you are "isolated" or "peripheral"? (circle one)

Completely in the Mainstream	Somewhat in the Mainstream	Neither in the Mainstream nor Isolated	Somewhat Isolated	Completely Isolated
1	2	3	4	5
15	14	13	6	Tot. = 48

11. How would you rate the degree or intensity of competition within your research specialty?

recode

Very Intense	Intense	Moderate	Low	Nonexistent	
1	2	3	4	5	
17		42	23		Tot. = 62

12. What are the reasons for this competition? (Check all that apply).

yes = 34	No= 39	Scarcity of or competition for funds	Tot.
21	52	Rival groups of collaborators	73
38	35	High achievement or success drive of persons in the field	
7	66	Some persons act unethically	
21	52	Strongly opposing views	
11	62	Other (please describe) :	

13. Please list the name of any other research specialties in which you are currently involved, and whether you are currently spending more time or less time on each one than on your EIES specialty.

Name		Other or		More time	Less time	Tot.
Spec. 1	None = 14	Equ.=	4	41	30	= 89
Spec. 2	39		2	22	25	= 88
Spec. 3	65		4	7	12	= 88

Spec. Importance (Scale 0-6)

0 = 7
1 = 6

2 = 15
3 = 11
4 = 22

5 = 14
6 = 13
88

1. During an average week, approximately how many hours do you spend on each of the following kinds of activities? (First list the total for all professional activities, then the number of these related only to activities within your specialty area).

	Total	Hours in Specialty only
Direct research activities		
Writing papers, books, etc.		
Education		
teaching		
learning: reading books or journals		
attending meetings, seminars, etc.		
Administrative and support activities (committee meetings, memos, etc.)		
Telephone		
inside your organization		
outside your organization		
Consulting		
Funding (grants applications or other resource acquisition activities)		
Other professional activities (please specify)		
Total		

% Spec. Imp.

<6 = 12
6-10 = 4
11-19 = 6
20-49 = 29
50+ = 31
82

2. Please list the names of any persons with whom you have co-authored or collaborated in research during the last year, or during the current one

0 = 16 3 = 16
1 = 9 4-9 = 31 Tot. 87
2 = 11 10+ = 4

3. Considering all current personal communication modes, what is the total number of different individuals within your research specialty with whom you are currently in contact? 0 = 3
1-2 = 9 3-5 = 11 6-9 = 6 10-19 = 25 20-49 = 15 50+ = 17 Tot. 86

4. How many of these are in your EIES user group? 0 = 9
1-2 = 24 3-5 = 22 6-9 = 10 10+ = 16 Tot. 81 Tot. 81

5. Scientists are sometimes anticipated by others in the presentation of research findings. That is, after they have started work on a problem another scientist publishes its solution. How often has this happened to you in your career? (Please exclude cases where a solution to your problem was published before you started your own work. Circle one.)

Recoded Constantly	Frequently	Time to Time	Rarely	Never	
1	2	3	4	5	
2	30	61	31	28	Tot. 90

6. How concerned are you that you might be anticipated in your current work?

Constantly	Frequently	Time to Time	Rarely	Never	
1	2	3	4	5	Tot. 90
9		58		23	

General Principles of Science

Described below are two sets of conflicting general principles which can guide the conduct and evaluation of scientific research. Please read each set of principles with your specialty area in mind.

Principle A. Emotional Neutrality

Scientists must be emotionally neutral and impartial towards their ideas if they are to stand a fair chance of ultimately being proved valid. Conducting an investigation with anything less than an impartial frame of mind possesses the danger that the scientist will bias results and be unable to give up hypotheses when they are indeed false.

Principle B. Emotional Commitment

Scientists must be emotionally committed to their ideas if they are to stand a fair chance of ultimately being proved valid. Unless a scientist believes intensely in his or her own ideas and does everything legitimately in his power to verify them, there is the danger that he will give up his ideas too quickly. Initial inconclusive signs of negative evidence do not warrant a reorientation of research efforts. The scientist must believe in himself and his own findings with great conviction.

7. On the basis of your own experience and observations, to what extent does each of the principles tend to govern the everyday working behavior of most scientists in your specialty? (Please circle one number).

	A Significantly More Than B	A Moderately More Than B	Both Tend to Govern Equally	B Moderately More Than A	B Significantly More Than A	Neither Tends to Govern
Recoded Tot. 85	1	2	3	4	5	6
	18		14	53		

8. To what extent does each of these principles tend to govern your own everyday working behavior?

	A Significantly More Than B	A Moderately More Than B	Both Tend to Govern Equally	B Moderately More Than A	B Significantly More Than A	Neither Tends to Govern
Recoded Tot. 89	1	2	3	4	5	6
	24		17	19	26	3

9. To what extent do you believe that each of the principles ought to govern the behavior of scientists in your specialty?

Recoded	A Significantly More Than B	A Moderately More Than B	Both Equally	B Moderately More Than A	B Significantly More Than A	Neither Should Govern
	1	2	3	4	5	6
	27	27	23	20	14	3

Principle C: The Irrelevancy of Personal Attributes

The personal attributes of a scientist are completely irrelevant in judging results and claims to knowledge. Each claim in science is judged impartially on its own merits by its ability to stand up to rational, empirical test procedures without reference to the particular scientist.

Principle D: The Relevancy of Personal Attributes

The personal attributes of a scientist are highly relevant in judging results and claims to knowledge. In reality the work of some scientists is given credence over that of others. It is necessary to know the personal characteristics, background and motivations of a scientist before one can properly evaluate his or her work.

As above, we wish you to indicate the extent to which these two principles tend to govern the everyday working behavior of most scientists in your specialty; tend to govern your own everyday working behavior, and ought to govern the behavior of scientists in your specialty.

Recoded		C Significantly More Than D	C Moderately More Than D	Both Equally	D Moderately More Than C	D Significantly More Than C	Neither
Tot. 85	10. Most scientists	1	2	3	4	5	6
		27		11	47		
89	11. Your own behavior	1	2	3	4	5	6
		15	22	12	40		
88	12. Ought to govern	1	2	3	4	5	6
		27	20	19	21		1

Part III Background Items (Please attach a vita, if available; and omit items covered in the vita).

Tot. 1. What is your age?

(1) 2 under 25 (4) 16 45 - 54
88 (2) 28 25 - 34 (5) 3 55 - 64
(3) 38 35 - 44 (6) 1 65 & over

87 2. Sex: (1) 5 female (2) 82 male

3. Please list your academic degrees (Degree, Subject, Institution, and year).

76 Bach = 2 Masters = 10 No Degree = 1 Tot. 73
<5 yrs = 16
Bach = 5 Ph. D, MD =59 5-9 = 29
10-19 = 18
20+ = 9

4. Have you ever won a prize, special award, or been elected to an honorary scientific society for your research accomplishments?

81 (1) 46 no
(2) 35 yes (Please list) ______________________

5. Professional Publications (please try to give exact numbers published in last year or underway; estimates are fine for previous works.)

	Currently in Progress	Published in Last Year	Published or Presented during Total Professional Career
Text books			
Other books			
81 Journal articles			
Papers presented			
Other (describe)			

6. I am more interested in generating a large number of alternate explanations for any problem than in pursuing one exclusively in detail.

90

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
1	2	3	4	5
14	22	30	20	4

7. I prefer to work in well-established research areas.

ot.	Strongly Agree 1	Agree 2	Neither Agree nor Disagree 3	Disagree 4	Strongly Disagree 5
92		2	31	49	10

8. How well known is your work, within your specialty area?

	1 Practically unknown	2	3	4 Average	5	6	7 Ranked at top of Field
87	14	11	9	15	16	13	9

Comments:

9. Do you think that the EIES system will affect familiarity with or the assessment of your work? Explain.

75

Yes, Considerably = 23

Yes = 26

Maybe = 14

No = 12

IV Communication Skills and Facilities

Tot. 1. Is English your primary language?

(1) 85 Yes (skip to question 2)
92 (2) 7 No
If not, what is your first language? ______________________

If English is not your first language, do you consider your English to be on a par with your primary language as to;

Writing	(1) 7	Yes	(2) 2	No
Speaking	(1) ______	Yes	(2) ______	No
Reading	(1) 8	Yes	(2) 2	No

2. How would you describe your English reading speed?

89 (1) 17 Very fast
(2) 54 Fast
(3) 18 Slow
(4) ______ Very slow

3. Comparing-your writing skills and your speaking skills, would you say you were more persuasive when

89 (1) 43 Writing (2) 36 Speaking equal 10

4. How would you describe your typing skills?

91 (1) 3 None
(2) 19 Hunt and peck
(3) 35 Casual (rough draft with errors)
(4) 22 Good (can do 25 w.p.m. error free)
(5) 12 Excellent (can do 40 w.p.m. error free)

5. I think computers are

: 1 :	2 :	3 :	4 :	5 :	6 :	7 :
Wonderful			(neutral)			Terrible
31	33	14	8	2		

88

6. Have you used computers in a batch mode for (check all applicable)

(1) 7 Have not used them
(2) 39 Information retrieval
91 (3) ______ Writing programs
(4) 74 Running existing programs
(5) 12 Other (specify) ______________________

7. Have you specified programs to be written by someone other than yourself?

92 (1) 69 Yes (2) 23 No

Tot. 8. Have you ever utilized a computerized message system, tele-conferencing or computerized conferencing system?

92 (1) 27 Yes (2) 65 No

(If yes, please indicate below which systems you have used).

None = 63 Arpanet = 2 Other = 13 6 ≟ 1

87 Planet-Forum = 2 Confer = 1 2+Others = 5

How often have you used computer terminals for: (Check one)

	Never (1)	Occasionally (2)	Frequently (3)
9. Text editing	43	24	24
10. Information retrieval	39	30	22
11. Programming	25	31	35
12. Packaged analysis programs	27	36	28
13. Data entry	27	36	28
14. Game playing	40	39	12
15. Other (specify)	78	2	11

91

Score

7 = 5
8 = 8
9 = 6
10 = 8
11 = 11
12 = 11
13 = 6
14 = 10
15 = 3
16 = 8
17 = 8
18 = 2
19 = 3
20 = 1
21 = 1

16. Have you ever utilized, on a regular basis, a TWIX or like communication system?

Tot.

(1) 13 Yes (2) 74 No 87

17. Please describe your access to a computer terminal at your office or place of work.

(1) 18 No terminal
(2) 25 Have my own terminal 90
(3) 47 Share a terminal

If shared: Own = 23

17a. On the average, how long does it take you to get to the terminal?

2 min = 20 6-9 = 1 No term = 15 85
2-5 = 24 10-19 = 1 ____________ Minutes 20+ = 1

17b. On the average, how long must you wait for someone else to get off the terminal before you can use it?

____________ Minutes

80

Own = 23
2 min = 11 6-9 = 1 20+ = 9
2-5 = 13 10- 19 = 9 No term = 14

18. Do you have a terminal which you keep at home?

Tot

(1) 15 Yes

(2) 51 No

91

18a. If no: Is there a terminal available to you that you can take home?

(1) 25 Yes

(2) ____ No

19. What types of terminals do you have access to? (Check all that apply)

1) 30 Hard Copy No hard copy = 9

89

a) Speed: No speed = 9

5 10 7 15 50 30 characters/second or more

b) Weight: No wgt. = 8

10 Under 20 lbs. 27 between 20 & 40 lbs.

25 over 40 lbs.

2) 6 Visual Display (CRT) No Term = 11

42 both

20. I would not trust computer storage of paperwork that I use daily.

5 Strongly agree

80

21 Agree

35 Disagree

19 Strongly disagree

Current Expectations
about the EIES

Tot

1. (a) Concerning the user information brochure about the EIES, check one of the following

(1) 3 Did not receive a brochure
(2) 18 Received a brochure, but haven't read it
89 (3) 50 Found the brochure easy to understand
(4) 8 Found the brochure hard to understand
(5) 10 Read the brochure, but can't evaluate it

(b) Is there any part of the Information Brochure or one-page User's Guide which you had difficulty understanding? (Please be as specific as possible, listing page or section number.) Is there anything that you felt was left out? Any other suggestions about the brochure and/or User's Guide?

2. Which features of the Conferencing System do you anticipate as being most useful to you? (Please rank multiple selections 1,2,3 etc.)

Tot	Not r'd	Ranked		Ranked 2	3	4 or better or r'd
91	12	(1) 37	Private messages between individuals	19	5	18
	13	(2) 28	Group discussion and conferencing	23	6	21
	50	(3) 2	Text editing features	6	12	21
	56	(4) 3	Personal notebooks	7	9	16
	51	(5) 0	Bulletin	8	9	23
	59	(6) 1	Searching the conference records	5	7	19
	76	(7) 0	Use of anonymous comments or pen names	3	1	11
	87	(8) 1	Other (specify) ____________	1	1	1

3. How much time in the average week do you foresee yourself using the EIES?

88 (1) 8 30 minutes or less
(2) 20 30 minutes to 1 hour
(3) 35 1 - 3 hours
(4) 17 3 - 6 hours
(5) 7 6 - 9 hours
(6) 1 9 hours or more

Tot

4. How often do you foresee yourself signing on the system to send or receive messages or discussion comments?

89

(1) 2 Once a month or less
(2) 9 2 - 3 times a month
(3) 17 Once a week
(4) 43 Two or three times a week
(5) 17 Daily
(6) 1 Several times a day

5. Do you anticipate entering the material into the System yourself or having somsone else do it for you?

92

(1) 64 Type it myself
(2) 4 Have it typed
(3) 24 Both will occur

6. Which statement best describes your incentive for using the System?

91

(1) 9 I am required to use it
(2) 11 I have been requested to use it
(3) 17 I am free to use it as I wish

7. Which of the following best describes your anticipation of the system's worth? (please check only one)

92

(1) 2 I think it will be useless
(2) 1 I think it is useful for others, but not for me
(3) 8 I am skeptical about it but willing to try it
(4) 2 I am basically indifferent or neutral
(5) 28 I think it will have limited, but some worth for me
(6) 40 I think it will be useful in many respects
(7) 6 I think it will revolutionize my work/communication processes
(8) 5 It depends (specify) ____________________

8. Which of the following do you feel will limit your probable use of the system? (If more than one applies, rank them 1,2,3, etc.)

90

Not r'd	Rank 1		Rank 2	3	4+, r'd
67	(1) 9	Incomvenient terminal location			
67	(2) 4	Preference for face-to-face communication	7	4	3
71	(3) 5	Preference for telephone communication	6	5	8
65		The people I wish to communicate with are not	4	2	8
82	(4) 10	on the system	8	3	4
49	(5) 2	Typing skill or lack of a typist	4	0	2
71	(6) 31	Not enough time	3	4	3
89	(7) 4	System too cumbersome or difficult	7	3	5
77	(8) 1	General dislike for computers	0	0	1
72	(9) 1	Prefer drafting by longhand or dictation	3	5	4
	(10) [illegible]	Other (specify) ____________________	4	1	6

9. Compared to the conventional means of communicating with your group, do you expect the EIES to

(1) 25 Involve less of your time
(2) 49 Involve more of your time
(3) 11 Involve the same amount of time

10. How do you think use of EIES will change your communications or work patterns? (Please be specific. What current activities would it replace?)

As 1st Answer
1 ?, little = 15
2 Replace rsrch = 4
3 < or > mail, phone = 16
4 < or > spec. activity = 8
5 > commen, contact = 29
6 Improve rsrch = 2
7 other = 5
8 no change = 5

11. Why do you personally wish to use EIES? (What do you think you, or your group, or the society, can gain from it?)

12. What disadvantage or negative consequences might possibly flow from your group's use of the system?

13. Any other comments?

14. How long did it take you to fill in this questionnaire? __________

THANK YOU VERY MUCH

Continuation Page

Continuation of Question # ____

Continuation of Question # ____

Continuation of Question # ____

Continuation of Question # ____

Continuation of Question # ____

APPENDIX B

FIRST FOLLOW-UP

QUESTIONNAIRE FOR USERS OF EIES

INTRODUCTION

TO:____________________________________

The questions below relate to your current reactions to the Electronic Information Exchange System, and to possible effects which it may have had upon your work and the development of scientific knowledge within your specialty area. It is the second of three questionnaires which you will be asked to complete for purposes of the overall evaluation of the impact of EIES.

As in all other phases of the evaluation of the EIES system, we will guard the confidentiality of your replies. A copy of your answers will be provided to the evaluator for your group. The data will not be released in an individually identifiable form to anyone else.

There is a continuation page at the end of the questionnaire, for any answers which do not fit in the alloted space. The numbers and spaces in the margins are for use in coding your answers. Because of the "protection of human subjects" regulations, I need to have your "written permission" to take part in this project. Please be sure to sign below and return the questionnaire.

In pretests, completion time averaged only twenty minutes. However, if for some reason you do not wish to complete this questionnaire please check the appropriate space below and return this questionnaire.

Starr Roxanne Hiltz, Ph.D.

Associate Director

Computerized Conferencing &
Communications Center
New Jersey Institute of Technology

________ I do not wish to complete this questionnaire because:

________ I agree to participate in this study

____
SIGNATURE

COL-CODE

I. ACCESS & USE PATTERN

1-4 _____

1. What are the main activities you have been engaging in on the EIES system, and with whom?

Tot.

2. Does anyone else use EIES under your ID? If so, please give their name and approximate on-line time per week.

5 _____

Yes = 16 No = 87 Other time on:

3. In an average week, how many times do you personally "log in" and use EIES? Approximately how long do you usually spend per session?

6-8 _____

9-10 _____

11-12 _____

Actual		Preferred
___________	Average # sessions per week	__________
___________	Minutes per average session	__________

13-14 _____

15-16 _____

4. How much time do you spend "off-line" in an average week doing EIES-related work (preparing entries, filing material received, etc).

___________ 17-19 _____

5. Of the time spent on EIES, what proportions do you spend at your office, at home, or at other locations?.

20-21 _____

22-23 _____

24-25 _____

___________ % at office

___________ % at home

___________ % Other (describe)

100%

COL/CODE

6. COMPUTER TERMINALS
(If you filled out a previous questionnaire and your access to terminals has not changed since then, check here and skip to question 7 on the next page).

Tot.

26 105 45 (43%) No change in terminal access since last questionnaire.

Change = 60 (57%)

27 106 a) Please describe your access to a computer terminal at your office or place of work.

1) 5 (4.7) No terminal 27 (25.5) No change

2) 40 (37.7) Have my own terminal

3) 34 (32.1) Share a terminal

If shared:

28 103 On the average, how long does it take you to get to the terminal?

Has Own = 64 (62%) 10-19 min = 4 (3.9)

< 2 = 17 (16.5) Minutes 2-5 = 12 (11.7%) 20+ = 3 (2.9) No term 3 (2.9)

On the average, how long must you wait for someone else to get off the terminal before you can use it?

Has own = 70 (69.3) 10-19 = 5 (5)

29 101 < 2 = 15 (14.9) Minutes 2-5 = 8 (7.9) No term = 3 (3)

c) Is there a terminal available to you that you can take home?

30 103 1) 8 (8) Yes no change = 29 (28)

2) 27 (26) No At home = 39 (38)

d) What types of terminals do you have access to? (Check all that apply)

no change = 29 (27.6)

31 105 1) 69 (65.7) Hard Copy no = 7 (6.7)

a) Speed: None = 2 (2) No hard copy = 35 (35)

32 101 4 (4) 10 4 (4) 15 56 (55) 30 characters/second or more

b) Weight: None = 1 No term = 35

33 101 24 Under 20 lbs. 17 between 20 & 40 lbs.

24 over 40 lbs.

34 105 2) 33 Visual Display (CRT) No change 30

42 No

7. Currently, do you yourself type material into EIES, does someone type it in for you, or do both occur? 35 110

1) 92 (84) Type in myself (Answer A below)
2) 5 (4) Have typed in (Answer B below)
3) 13 (12) Both occur (Answer A & B)

A. What type of material do you type yourself? (If more than one, rank-order by frequency). 36 ____

Main = 76	oth. = 16	not r'd = 2	I type in previously unwritten thoughts/ideas e.g., I compose on line. N/A = 4	98
Main = 16	oth. = 30	not r'd = 6	I type in rough drafts from outlines or notes. N/A = 2	54
Main = 8	oth. = 6	not r'd = 14	I type in material that was previously written out and edited. N/A = 3 2 or more r'd = 2	33
Main = 2	oth. = 1	2 or more = 1	Other (describe) N/A = 1	

B. What are the main reasons why you have chosen to have someone else input material for you? (If more than one, please rank-order)

	oth. = 2	not r'd = 15	I don't know how to use the system. N/A = 91	37 108
Main = 7	oth. = 1	not r'd = 9	I don't have time to use the system myself.	38 ____
2	3	13	I do not know how to type.	39 ____
	2	15	I find using the system directly, i.e., typing at a terminal, incompatible with my professional role or job description.	40 ____
	1	16	I dislike working on line (describe why in the space below)	41 ____
7	2	8	Other (please describe)	42 ____

COL/CODE

8. What do you do with the print-outs of material from EIES?

43 109 1) 4 Throw them all out.

2) 20 Keep them all.

3) 25 Save selective entries in a single file or pile

4) 37 Save selective entries in separate files (please explain filing system below: by subject, author, group, or what).

5) 5 I use a CRT and do not generate print-outs

6) 16 Other (Please describe)

0 = 3 (1.4%) <5 = 132 (62%) 5-10 = 40 (18.8) 11-15 = 11 (5.2%) 16+ = 27 (12.7)

44-45 213 7. How many different people do you feel you are actually exchanging information or communicating with on this system, currently? ______
0=18 (8.5) <5 = 143 (67.1) 5-10 = 45 (21.1) 11-15 = 1 (.5) 16+ = 6 (3.8)

46-47 213 8. Of these, how many have you "met" (gotten to know) over EIES? ______

48 104 9. Have you sent transcripts or other material to persons outside the EIES system, invited other persons to be informal "observers" or otherwise expanded participation beyond your user group? (please explain).

Yes = 54 (52%)

No = 50 (48%)

49 ______ 10. At the present time, which of the following best describes your EIES group?
41 More of a collection of individuals than a research community
54 A set of cliques or subgroups with interests and activities in common, but not an integrated community
3 A well integrated research community that shares many interests and activities in common

COL/CODE

II. OVERALL REACTIONS TO THE EIES MODE OF COMMUNICATION

These questions relate to your overall reactions to the system at this point, as a means of communication and work coordination for your user group. They consist of a number of rating scales on which you are to circle one number which corresponds to where you would place your own impressions of the system on that dimension. For example, here is the first scale:

1. Overall, the EIES communication system is

	12	38	30	7	10	4	0	
	1	2	3	4	5	6	7	53 _____
	Extremely Good			Neutral			Extremely Bad	
	(12)	(38)	"	"	"	"	"	

If you think that the system is extremely good, you should circle 1. If you think the system is quite good, you should circle "2"; 3 would mean that the good aspects slightly outweigh the bad aspects. "4", the middle point, should be checked only when the words at the two ends of the scale describe the system equally well. Continuing on, "5" would mean that you feel that the bad aspects slightly outweigh the good aspects, etc.

I find using EIES to be

	22	41	30	8	9	1	0	
2.	1	2	3	4	5	6	7	54 _____
	Stimulating			Neutral			Boring	
	(19.8)	(36.9)	(27)	(7.2)	(8.1)	(.9)		
	7	24	39	17	16	4	3	
3.	1	2	3	4	5	6	7	55 _____
	Productive						Unproductive	
	(6.4)	(21.8)	(35.5)	(15.5)	(14.5)	(3.6)	(2.7)	
	17	40	25	15	12	2	0	
4.	1	2	3	4	5	6	7	56 _____
	Great Fun						Unpleasant Work	
	(15.3)	(36)	(22.5)	(13.5)	(10.8)	(1.8)		
	11	16	21	27	24	7	4	
5.	1	2	3	4	5	6	7	57 _____
	Time-Saving						Time-Wasting	
	(10)	(14.5)	(19.1)	(24.5)	(21.8)	(6.4)	(3.6)	
	9	12	25	24	26	10	5	
6.	1	2	3	4	5	6	7	58 _____
	Not Frustrating						Frustrating	
	(8.1)	(10.8)	(22.5)	(21.6)	(23.4)	(9)	(4.5)	

COL/CODE		1	2	3	4	5	6	7	MEANS? Std. Dev.	Sig
59 ____	7.	18	35	31	16	6	4		1.2644	.9303
		Friendly						Impersonal		
60 ____	8.	18	31	24	20	14	3		1.3717	.3227
		Easy						Difficult		

Does using EIES become so demanding of your time and energy that it intrudes upon your capacity to engage in other professional or personal activities?

		1	2	3	4	5	6	7	Std. Dev.	Sig
61 ____	9.	16	18	22	24	26	3	1	1.4813	.1110
		Not demanding or Intrusive						Very demanding or Intrusive		

62 ____ 10. When you send a message over EIES rather than writing or telephoning, would you say that recipients are generally

1) 39 ____ More responsive to an EIES message.

2) 26 ____ Less responsive

3) 33 ____ No difference

3 > writing but < phoning

63 ____ 1. What is the attitude of your wife, children, or other persons with whom you live towards your use of EIES?

64 ____ 2. Which statement best describes your present reaction to EIES ? (Please check only one)

1) 0 ____ I think it is useless and should be discontinued

2) 4 ____ I think it has its uses for others but not for me

3) 8 ____ I am skeptical but am giving it a try

4) 0 ____ I am basically indifferent or neutral

5) 44 ____ I think that it has certain worthwhile uses for me

6) 33 ____ I think it is very useful in many respects

7) 18 ____ I think it is revolutionizing my work/communications processes.

III. REACTIONS TO SPECIFIC FEATURES OF THE EIES SYSTEM

COL/CODE

1. How valuable or useful do you currently find each of the following features or capabilities of the Electronic Information Exchange System for your own communications activity? (If you have not actually used a feature, please check "cannot say").

	1 Extremely Valuable	2 Fairly Useful	3 Slightly Useful	4 Useless	5 Cannot Say	
Private Messages	66	36	4	1	3	65 _____
Group Messages	29	41	23	6	9	66 _____
Group Conferences	28	42	21	5	13	67 _____
Private Conferences	28	24	8	6	43	68 _____
Public Conferences	16	25	26	9	33	69 _____
Notebooks	14	20	8	7	59	70 _____
The Directory	29	34	20	5	20	71 _____
Retrieval Capability	24	23	14	6	38	72 _____
Text Editing	30	34	14	8	23	73 _____
Anonymity or Pen Name	3	11	17	31	46	74 _____
Explanations	12	31	23	11	31	75 _____
+ SEN	10	12	10	2	69	76 _____
String Variables	13	5	9	2	75	77 _____
News	17	30	35	4	21	78 _____

Comments or suggestions about improving these features or desirable new features? 79-80 _____

COL/CODE

2. Did someone demonstrate EIES to you in person or did you learn from the written materials?

1-4 ____ 1) __32__ live teacher

5 ____ 2) __77__ written material only

6-7 ____ 3. How long did it take you to learn to use EIES reasonably well?

1-5 = 184 hours 6-10 = 18 11-15 = 4 16+ = 7

4. Do you now find "How to Use EIES" (on a scale of 1 to 5)

		51	41	12	3	1	
8 ____	a) understandable	1	2	3	4	5	not understandable
		43	45	7	8	3	
9 ____	b) easy to read	1	2	3	4	5	hard to read
10 ____	c) well organized	1	2	3	4	5	not well organized
		27	43	25	10	2	

11 ____ 5. Suggestions for improvement of the Documentation.

none = 4

Sugg = 43

5a. Do you currently need the users guide (one sheet) or "How to Use EIES" to operate the system?

12 ____ 1) __31__ User's guide 2) __16__ "How To" 3) __37__ Nothing more than 1 = 20

13-14 ____ 5b. If you now operate the system from memory, how long did you rely on the guide to get you through the system? 1-5 = 186 hours 6-10 = 18 11-15 = 3 16+ = 6

15 ____ 6. Have you ever asked a user consultant for help?

1) __26__ No

2) __4__ Yes (Please describe whether this was helpful, satisfactory, courteous, or what).

Yes, good = 67 Not reached = 5

Yes, reg. or mixed = 6

7. How would you rate the performance of

			51	29	18	4	2	
16 ____	Your group leader? (principal investigator)	Excellent	1	2	3	4	5	Poor
			29	25	24	2		
17 ____	Systems monitor (EIES, 100)	Excellent	1	2	3	4	5	Poor

COL/CODE

8. Do you find the language of the system understandable?

	45	43	14	3	3		
a) Understandable	1	2	3	4	5	Confusing	18 ______
b) Courteous	1	2	3	4	5	Inhuman	19 ______
	42	40	16	3	4		

9. (Direct editing commands)

Do you find the use of the +, -, * (special symbols) etc. to be

	34	28	22	11	11		
Easy to remember	1	2	3	4	5	Hard to remember	20 ______
Easy to use	1	2	3	4	5	Hard to use.	21 ______
	39	36	16	7	7		

Comments?

10. Indirect editing commands (.text, .tabs, etc)

Good	1	2	3	4	5	Poor	22 ______
	9	9	20	5	8		

Comments?

11. Which of the following do you currently use to operate the system?

	1 Never	2 Sometimes	3 Frequently	4 Often	
long menu	28	32	15	15	23 ______
short menu	15	38	13	28	24 ______
"answer ahead"	28	26	19	16	25 ______
commands	17	30	16	25	26 ______
string variables	62	20	2	6	27 ______

12. (Answer only if you have used both menus and commands)
Do you now think it is a good idea or a poor idea to introduce the new user to the system through menus, and provide equivalant commands for those who prefer them?

__54__ Good to use menus first

__19__ Should teach commands from the start

5 = Other

13. In EIES, you do not have the choice of permanently refusing to accept a private or group message. Which of the following would you prefer?

__51__ Require acceptance of all messages, as at present
__17__ Require acceptance of private messages only
__26__ Allow rejection of any message, with "message refused by ### returned to the sender

Comments?

1-10

Time to complete (to be corrected)

COL/CODE

13. Thinking back over your experiences so far with the system, how frequently have you felt..(check one)

		1 Always	2 Almost Always	3 Some-times	4 Almost Never	5 Never
28 _____	Distracted by the mechanics of the System	6 (5.6%)	17 (15.7)	53 (49.1)	25 (23.1)	7 (6.5)
29 _____	Constrained in the types of contributions you could make	4 (3.7)	18 (16.8)	47 (43.9)	30 (28)	8 (7.5)
30 _____	Overloaded with information	5 (4.5)	20 (18.2)	60 (54.5)	18 (16.4)	7(6.4)
31 _____	Able to express your views	26 (24.3)	50 (46.7)	26 (24.3)	5 (4.7)	0
32 _____	Able to get an impression of personal contact with other participants	9 (8.3)	38 (34.9)	50 (45.9)	7 (6.4)	5 (4.6)

14. How satisfactory do you think the system is for the following activities?

		COMPLETELY SATISFACTORY 1	2	3	4	5	6	COMPLETELY UNSATISFACTORY 7
33 _____	Giving or receiving information	29 (26.9)	47 (43.5)	20 (18.5)	9 (8.3)	3 (2.8)		
34_____	Problem solving	6	18	27	27	11	11	1
35_____	Bargaining	4	16	16	25	11	12	3
36_____	Generating ideas	24	29	27	10	6	4	3
37_____	Persuasion	1	13	20	29	20	11	2
38_____	Resolving disagreements	1	15	24	21	15	15	3
39_____	Getting to know someone	1	23	31	20	17	8	2
40_____	Giving or receiving orders	14	20	18	22	10	3	2
41_____	Exchanging opinions	28 (26.4)	47 (44.3)	25 (23.6)	4 (3.8)	0	2 (1.4)	

PLEASE PLACE A CHECK MARK OR X IN THE APPROPRIATE BOX TO INDICATE WHETHER EACH OF THE FOLLOWING FACTORS HAS BEEN VERY IMPORTANT, SOMEWHAT IMPORTANT, OR NOT IMPORTANT AT ALL IN LIMITING YOUR USE OF THE EIES SYSTEM.

COL/CO

1-4 ____

Most Imp.	REASON	VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT	
18 (9.3%)	INCONVENIENT ACCESS TO A TERMINAL	37 (19%)	35 (18%)	123 (63%)	5 ____
3 (1.6%)	RED NOTEBOOK DOCUMENTATION LOOKED LIKE TOO MUCH TO READ	11 (5.6%)	52 (26.7%)	132 (67.7)	6 ____
6 (3.1)	THE SYSTEM IS TOO COMPLICATED	17 (8.8%)	49 (25.4)	127 (65.8)	7 ____
5 (2.6)	TROUBLE WITH PHONE	19 (9.7)	33 (16.8)	144 (73.5)	8 ____
6 (3.1)	TROUBLE TELENET	30 (15.3)	38 (19.4)	128 (65.3)	9 ____
11 (5.7)	COST OF TELEPHONE TELENET	17 (9)	22 (11)	156 (80)	10 ____
14 (7.3)	HAD SOME BAD EXPERIENCES (SYSTEM CRASHED OR DID NOT SEEM TO WORK CORRECTLY)	21 (11)	61 (31)	113 (58)	11 ____
17 (8.8)	LIMITED NIGHT OR EVENING HOURS	38 (19.6)	40 (20.6)	116 (59.8)	12 ____
4 (2.1)	I DO NOT LIKE TO TYPE	10 (5.1)	30 (15.4)	155 (79.5)	13 ____
2 (1)	I DO NOT LIKE USING A COMPUTER SYSTEM LIKE THIS	6 (3)	15 (8)	173 (89)	14 ____
5 (2.6)	THERE IS NO ONE ON THIS SYSTEM WITH WHOM I WISH TO COMMUNICATE A GREAT DEAL	13 (7)	31 (16)	151 (77)	15 ____
3 (1.6)	I AM NOT VERY INTERESTED IN THE SUBJECTS BEING DISCUSSED	11 (6)	33 (17)	151 (77)	16 ____
67 (34.7)	OTHER PROFESSIONAL ACTIVITIES MUST TAKE HIGHER PRIORITY	93 (47.4)	59 (30.1)	44 (22.4)	17 ____
9 (4.7)	THE CONFERENCE COMMENTS OR MESSAGES I HAVE RECEIVED DO NOT SEEM WORTH READING	13 (7)	61 (31)	121 (62)	18 ____
0 (0)	INADEQUATE LEADERSHIP OF THE GROUP	10 (5	31 (17)	146 (78)	19 ____
23 (11.9)	OTHER (PLEASE DESCRIBE)	39 (57.4)	7 (10.3)	18 (26.5)	20 ____
Tot. 193					

NOW, PLEASE GO BACK AND CIRCLE THE SINGLE MOST IMPORTANT FACTOR. 21 ____

COMMENTS OR EXPLANATIONS?

V. Conclusion

1. Are there any ideas which you are using or working with at present, which you first learned of on EIES? (Please try to be specific about what you read and what impact it has had on your work).

2. Are you working on any projects or papers at the present time which have been advanced by your use of EIES? (Again, please try to give us some specific details.)

3. Are you coauthoring or collaborating closely with any members of EIES at the present time, using the EIES system? If so, please describe who you are collaborating with, on what, and how you are using EIES in this effort.

4. Are there any "new uses" you have invented for EIES, that are helping you in your work? These uses might not be related to the specific purpose of your group, but we would like to know about them. For example, you might use it to communicate with your family while away on business trips. To coordinate face to face meetings or conferences with other EIES members...

5. Overall, what would you say have been the main negative aspects of use of EIES for your group this far? What things that you wish to accomplish, have not occured, or what undesirable things have occured, that might be attributed to characteristics of communication over the system? Please explain as fully as possible.

6. How long did it take you to complete this questionnaire?_________________

Any additional comments?

Continuation Page

From
question # __________, p.__________

From
question # __________, p.__________

APPENDIX C

POST-USE QUESTIONNAIRE

COL

EIES ID ______ 1-4 ______

Part I: Your EIES Group's Research Specialty

5-6 ______

Your specialty group is

Name ______________________

Number ______________________

1. Is there a commonly accepted "intellectual mainstream" in the specialty? 7 ______

(1) 51 Yes (2) 50 No

2. To what extent do you feel that you and those with whom you collaborate are in the recognized intellectual "mainstream" of the specialty, or conversely feel you are "isolated" or "peripheral"? 8 ______
(circle one)

Completely in the Mainstream	Somewhat in the Mainstream	Neither in the Mainstream nor Isolated	Somewhat Isolated	Completely Isolated	(no mainstream)
1	2	3	4	5	
16	27	34	15	0	10

How would you rate the degree or intensity of competition within the research specialty? 9 ______

Very Intense	Intense	Moderate	Low	Nonexistent
1	2	3	4	5
2	15	52	29	4

3. What are the reasons for this competition? (Check all that apply).

______	Scarcity of or competition for funds	10 ______
______	Rival groups of collaborators	11 ______
______	High achievement or success drive of persons in the field	12 ______
______	Some persons act unethically	13 ______
______	Strongly opposing views	14 ______
______	Other (please describe) :	15 ______
______	______________________	

COL

4. Please list the four major or outstanding people in the entire research specialty (not just those on EIES), and the extent to which you currently know them personally and/or are in direct contact with them?

16 ______
17 ______
18 ______
19 ______
20 ______
21 ______
22 ______
23 ______

Extent of Current Contact

			Constant	Frequently	Occasion-ally	Rarely	Never
	a.	$\bar{X}$=2.85	13 1	22 2	24 3	21 4	7 5
(on EIE?)y=	b.	$\bar{X}$=3.03	13 1	16 2	25 3	21 4	12 5
y=49	n=29						
y=41	n=32	$\bar{X}$=3.22	7 1	15 2	24 3	27 4	10 5
y=37	n=38	$\bar{X}$=3.42	5 1	13 2	23 3	17 4	19 5

24-25____ 5. Considering all current personal communication modes, what is the total number of different individuals within the research specialty with whom you are currently in contact? $\bar{X}$

26-27____ 6. How many of these are on EIES? $\bar{X}$=10.78 Media n=6.43
S.D. = 12.7

28 ____ 7. At the present time, which of the following best describes your EIES group?

42 (1) More of a collection of individuals than a research community
43 (2) A set of cliques or subgroups with interests and activities in common, but not an integrated community
14 (3) A well integrated research community that shares many interests and activities in common

29 _____ 8. Has EIES helped to clarify any theoretical controversies in the specialty area?

9 (1) yes, a great deal
39 (2) yes, somewhat
52 (3) no

If yes - please explain briefly the theoretical issue which you think has been clarified through EIES discussions, and the extent to which it has been resolved.

30 _____ 9. Has EIES helped to clarify any methodological controversies in the specialty area?

4 (1) yes, a great deal
36 (2) yes, somewhat
59 (3) no

If yes - please explain the methodological issue which has most benefitted from EIES discussion, and the extent to which you think the issue has been resolved.

COL

Part II Your Work

1. Please list the names of any persons with whom you have co-authored or collaborated in research (colleagues both on and off EIES) since the time you began using EIES. 31_____

0 = 23
1 = 20
2 = 9
3 = 11
4-9 = 17
10+ = 4

2. Professional Publications (please try to give exact numbers published in the last year or underway; (means)

	Currently in Progress	Published in Last Year
Text books	.24	.03
Other books	.45	.22
Journal articles	3.1	3.1
Papers presented	2.4 median = 1.3	2.7 (median = 1.5)
Other	.66	1.7

3. How well known is your work, within your specialty area? 52_____

	Practically unknown			Average			Ranked at top of Field
	8	15	10	23	24	14	10
$\bar{x}$ = 4.1	1	2	3	4	5	6	7

For the statements below please circle the response which indicates your degree of agreement.

4. Use of EIES has increased my productivity in terms of the quality of work recently completed or underway. 53_____

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
	1	2	3	4	5
$\bar{x}$ = 3.05	5	33	30	21	14

5. Use of EIES has increased my productivity in terms of the quantity of work recently completed or underway. 54_____

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
	1	2	3	4	5
$\bar{x}$ = 3.23	5	23	33	27	15

6. Use of EIES has increased my "stock of ideas" that might be used in future work. 55_____

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
	1	2	3	4	5
$\bar{x}$ = 2.42	19	53	9	13	9

COL

7. EIES has changed my view of how my own work relates to that of others in my specialty.

56 ______	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	
	1	2	3	4	5	
	11	37	26	22	6	$\bar{X}=2.76$

8. Participation in EIES contributes to:

a) Short term professional advancement in terms of my current employment

57 ______	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	
	1	2	3	4	5	
	6	25	30	26	15	$\bar{X}=3.19$

b) Short term professional advancement in terms of my status among my peers in my specialty

58 ______	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	
	1	2	3	4	5	
	7	35	37	13	9	$\bar{X}=2.82$

c Long term professional advancement with respect to employment

59 ______	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	
	1	2	3	4	5	
	3	29	37	19	13	$\bar{X}=3.09$

d) Long term professional advancement with respect to my status among my peers in my specialty

60 ______	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	
	1	2	3	4	5	
	7	35	39	12	8	$\bar{X}=2.79$

9. EIES has provided me leads, references, or other information useful in my work.

61 ______	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	
	1	2	3	4	5	
	30	51	8	11	2	$\bar{X}=2.79$

10. EIES has increased the familarity of others with my work.

62 ______	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	
	1	2	3	4	5	
	9	45	34	11	3	$\bar{X}=2.54$

11. EIES has changed my understanding of the interests and/or activities of others in my specialty.

63 ______	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	
	1	2	3	4	5	
	14	47	27	11	3	$\bar{X}=2.43$

COL

12. How many different people do you feel you are actually exchanging information or communicating with on this system, currently? x=10.7 64-65 ______

13. Of these, how many have you "met" (gotten to know) over EIES? x=5.4 66-67 ______

14. Compared to the conventional means of communicating with your group, has EIES

(1) 36 Involved less of your time
(2) 48 Involved more of your time
(3) 11 Involved the same amount of time 68 ______

15. Has the use of EIES changed the amount of your use of other media in the last year?

Medium	1 Increased	2 No effect	3 Decreased	
telephone	13	63	23	69
mails	20	45	34	70
travel to professional meetings	10	78	11	71
visits with researchers in other locations	12	75	12	72
reading journals or books	28	64	8	73

16. Has the use of EIES affected your communication with any of the following? Colleagues at your institution or organization.

25 (1) Increased 74 ______
4 (2) Decreased
72 (3) No change

17. Colleagues in your specialty but not on EIES

26 (1) Increased 75 ______
2 (2) Decreased
73 (3) No change 76 ______

18. During the year or more that you have been a member of EIES, have you noticed that it has had any impacts on the way in which you think and work, in general?

______ No 77-78______
______ Yes 79-80______ =08

If yes-- please describe these impacts in as much detail as possible.

COL

1-4 _____ 19. Communications with researchers in other disciplines or specialty areas

45 (1) Increased
1 (2) Decreased
54 (3) No change

5 _____ 20. Comparing my contributions or effort put into EIES with the amount of information received, I feel that I have

5 (1) Contributed significantly more than I have received
13 (2) Contributed more than I have received
40 (3) About equal
23 (4) Received more
20 (5) Received significantly more than I have contributed

6 _____ 21. How satisfactory do you think the system is for the following activities? (circle one)

1 = COMPLETELY SATISFACTORY — 7 = COMPLETELY UNSATISFACTORY

7	$\bar{X}=2.43$	Giving or receiving information	24 1	41 2	13 3	10 4	7 5	3 6	0 7
8	$\bar{X}=3.92$	Problem solving	3 1	15 2	17 3	28 4	22 5	7 6	4 7
9	$\bar{X}=4.13$	Bargaining	5 1	8 2	14 3	25 4	16 5	8 6	8 7
10	$\bar{X}=2.77$	Generating ideas	15 1	30 2	35 3	8 4	7 5	1 6	3 7
11	$\bar{X}=4.23$	Persuasion	4 1	5 2	29 3	17 4	19 5	15 6	8 7
12	$\bar{X}=4.08$	Resolving disagreements	5 1	8 2	26 3	21 4	16 5	14 6	7 7
13	$\bar{X}=3.25$	Getting to know someone	5 1	29 2	33 3	13 4	7 5	7 6	4 7
14	$\bar{X}=3.21$	Giving or receiving orders	9 1	33 2	13 3	17 4	7 5	5 6	6 7
15	$\bar{X}=2.34$	Exchanging opinions	25 1	41 2	19 3	5 4	5 5	1 6	2 7
16	$\bar{X}=3.30$	Expressing positive information	7 1	24 2	32 3	15 4	8 5	4 6	6 7
17	$\bar{X}=3.54$	Empressing negative emotions	7 1	22 2	20 3	21 4	16 5	5 6	5 7
18	$\bar{X}=3.86$	Sociable relaxation	2 1	19 2	25 3	21 4	12 5	7 6	10 7

COL

22. Please estimate the maximum you would pay for EIES under the conditions described and how much you would use it.

(medians, including ZEROS)

	Cost in Dollars per Hour	Hours of Use Per Week	COL
EIES with current membership if a) Financed from your pocket	$2.40		19-20 ______ 21-22 ______
b) Financed by another source	$6.38		23-24 ______ 25-26 ______
EIES with peer group of your choice, if a) Financed from your pocket	$3.58		27-28 ______ 29-30 ______
b) Financed by another source	$8.50		31-32 ______ 33-34 ______

23. What one or two factors best explain why you have not used EIES more?

[redacted]

35 ______

36 ______

37-38 ______

24. How many hours do you feel it took you

a) To learn the basic mechanics of sending and receiving messages and comments ______ hours (median = 1.84) 39-40 ______

b) To feel comfortable communicating with others using this medium ______ hours 41-42 ______

c) To learn the advanced features which you wanted to use ______ hours 43-44 ______

III. Reactions to Specific Features of the EIES System

1. How valuable and useful do you currently find each of the following features or capabilities?

	Frequency of Use			Value					
	(1) Frequently	(2) Occasionally	(3) Never Used	(1) Extremely Valuable	(2) Fairly Useful	(3) Slightly Useful	(4) Useless	(5) Cannot Say	
Private Messages	69	28	2	67	20	10	0	1	45 ______ 46 ______
Group Messages	22	57	19	35	27	26	2	6	47 ______ 48 ______
Private Conferences	23	41	33	33	24	8	4	28	49 ______ 50 ______
Group Conferences	44	37	16	36	31	14	2	13	51 ______ 52 ______
Private Notebooks	6	32	58	13	23	6	5	48	53 ______ 54 ______
Group Notebooks	3	18	73	7	15	7	5	62	55 ______ 56 ______
The Directory	16	68	13	32	33	16	3	10	57 ______ 58 ______
Chimo	27	42	27	17	23	22	5	29	59 ______ 60 ______
Retrieval of items already read	11	60	27	30	29	9	3	26	61 ______ 62 ______
Searches for items	5	52	39	27	15	17	1	35	63 ______ 64 ______
Voting	11	83	11	2	12	8	1	73	65 ______ 66 ______
Use of ?;??	6	40	44	11	22	15	4	38	67 ______ 68 ______
Explanation File	3	38	44	9	17	17	4	38	69 ______ 70 ______

79-80 = 09

	(1) Frequently	(2) Occasion-ally	(3) Never Used	(1) Extremely Valuable	(2) Fairly Useful	(3) Slightly Useful	(4) Useless	(5) Cannot Say	1-4=ID
Synchronous discussions in conferences	2	22	72	8	11	16	2	60	5 ______ 6 ______
System commands (e.g., +cnm)	34	36	26	37	24	7	1	24	7 ______ 8 ______
User defined commands (+Define)	3	23	70	20	15	4	0	59	9 ______ 10 ______
Anonymity or Pen Name	6	22	67	10	12	16	12	45	11 ______ 12 ______
User consultants and/or HELP(110)	12	63	21	47	19	7	3	19	13 ______ 14 ______
Text editing (direct) (e.g;/old/new/;*)	45	29	21	49	19	2	1	23	15 ______ 16 ______
Text editing (indirect) (e.g.; text)	12	20	63	20	17	2	0	57	17 ______ 18 ______
Games (e.g. +story)	1	32	63	3	6	19	11	57	19 ______ 20 ______
Special programs (e.g. +terms; +respond)	1	19	76	9	9	7	0	72	21 ______ 22 ______
Interact programming	1	5	88	5	3	7	0	80	23 ______ 24 ______
Terminal Control features (e.g. +Left, +page;+slp)	5	25	66	10	18	6	0	63	25 ______ 26 ______
Graphics routines	3	92	10	7	5	2	1	81	27 ______ 28 ______
+SEN and ???	15	25	55	18	19	8	2	50	29 ______ 30 ______
Tailored Interfaces (e.g., + Legitech)	8	75	22	3	5	3	0	74	31 ______ 32 ______

2. Are there any particular features of EIES you have found to be (Please describe and comment)

a) Unique and valuable to this type of system?

b) Useless, distracting and/or out of place in this type of system?

c) What general improvements/new features/changes would you like to suggest for EIES?

3. EIES is now at the stage where certain individual users and groups are constructing specialized interfaces and data structures. Do you now see any particular items of this nature that would have been particularly beneficial to your group?

4. Any other comments on the EIES system or its impacts, or on this questionnaire?

THANK YOU!!!

APPENDIX D

RESPONSE RATE, EIES QUESTIONNAIRES

GROUP	30	35	40	45	54	TOT	RATE
PRE-USE							
SENT	30	35	40	35	35	175	
RETURNED	15	23	32	22	8	98	56%
SHORT F-UP							
SENT	10	14	20	31	26	101	
RETURNED	9	12	16	26	12	75	75%
LONG FOLLOW-UP							
SENT	26	35	37	27	15	140	
RETURNED	22	24	30	21	9	106	69%
POST-USE							
SENT	25	30	42	30	30	157	
RETURNED	19	24	31	19	8	102	65%

APPENDIX E

SAMPLE USER CONSULTANT FILE REPORTS, EIES

1. SUMMARY OF USER INQUIRIES FOR FEBRUARY, 1978

During the month of February, one hundred and forty one interactions between user consultants and users were logged. This log includes the problems addressed to the user consultants and the responses to them. The log was established by Roxanne Hiltz to serve as an unobtrusive way of collecting data on user problems, out of which data could emerge a basis for making decisions regarding the nature of and priority of improvements in documentation and other features needed for the EIES system.

The main problems encountered are similar to those of earlier months:

1) There were fifteen problems with the use of the various commands for copying in and out of the scratchpad (&<M12345, +cy C29C40, +cya n104 p28, etc.). This material is considered an "advanced feature" and is not described in "How to Use EIES." However, since various versions of the system were initiated during the month, even experienced users were caught unawares by the changes in specifications, such as whether or not the @ sign should be included in a command.

2) A related problem involved seven requests on how to use the storage areas. Their usage is briefly described in the user materials; unfortunately, the examples given do not work with current versions of the system.

3) Eight more new users reported the "mysterious problem of double printing." More instructions telling how to set the terminal for half duplex and informing the user that double printing means that something is not set for half duplex need to be included in the next revised version of the basic user materials.

4) There were ten problems with the use of notebooks, which are a feature not specifically documented in the existing user materials. Involved in these were five new users who assumed that one gets a personal notebook automatically. One suggestion is that either Murray Turoff or the System Monitor send a message, waiting for all members when they first sign on, instructing them as to how to request a personal notebook or conference from the System Monitor.

5) There were several users at the beginning of the month complaining that they did not know how to find out what conferences were going on in the system. One of them sent a marvelous description of the "Catch 22" situation:

KEYS:/I WANT TO JOIN/

IN ORDER TO GET MESSAGES FROM A CONFERENCE, YOU MUST BE A MEMBER.

IN ORDER TO BECOME A MEMBER, YOU MUST GET THE OK OF THE CONFERENCE MONITOR.

IN ORDER TO FIND OUT WHO THE MONITOR IS, YOU MUST QUERY THE SYSTEM ABOUT THE CONFERENCE.

BUT IN ORDER TO QUERY THE SYSTEM ABOUT A CONFERENCE, YOU MUST BE A MEMBER.

THUS IN ORDER TO JOIN A CONFERENCE, YOU MUST ALREADY BE A MEMBER.

***************UGH!!!!!***************

I WOULD LIKE A LIST OF ALL THE CONFERENCE TITLES AND A LIST OF CORRESPONDING CONFERENCE MONITORS SO I CAN ASK TO JOIN THOSE THAT LOOK INTERESTING.

This problem was resolved by setting up Public Conference 1008 for a listing and description of all conferences on the system that others may ask to join and by having the group moderators send out messages to their groups reminding them of the various conferences and moderators.

6) There were eight "bug" reports, which were referred on to the programmers.

No other problems were reported more than twice.

Resolution of problems one and two is now being discussed.

2. Analysis of User Consultant File

Items 889-1127;Aug 19 through October 31, 1978

Roxanne Hiltz

During this period, many new users became active on the system. These included the initial members of the three new DIST groups, the Mr. Fit group, and the two student groups, replacement or new members of old groups, and some individuals. In reporting and categorizing inquiries to the user consultants, a rough division has been made into "new" and "old" users. ANy recent new member is considered a "new user", and this was determined by having an id for a new group. IN other cases, persons who have been on the system but have not used it much are also considered "new users". Any person who did not look familiar was checked in the listing of usage stats and considered new if total time on line to date was less than five hours.

Also separated out are the requests of new group leaders and facilitators, so see if their needs are notably different from those of other new members.

Let us take the new users questions first.

1. "Somebody talk to me..." 6

Some of the variations on the request of first time users for attention and immediate feedback are most interesting in their wording. Exs

"Is anybody out there reading this now?.. tell me something. ANything, so I'll know somebody's out there and I'm operating this blank thing right!"

"This is the first message of a wandering wordsmith caught in a time warp."

2. How can I delete conference comments entered mistakenly, and resend them as messages? 5

Copying items-5

How do I communicate in real time? 4

How do I send a message to X (what is his name or number?)-4

How to enter a conference comment-4

Editing Directory entry-3

How do I get a list of conferences that can be joined?-3

How to reset a conference marker-3

How to retrieve old messages-2

Has not received red manual-2

empty or unclear ???'s-2

Other New User Inquiries

How to send a message

How to delete redundant zip code from directory

Truble reading selected messages from waiting queue

Trouble with .tabs

How to get back to single spacing

Am I on a time budget?

Setting margins

REsetting conference markers

Accessing a notebook

How to turn off menu printing

Can you get back a NP mistakenly erased?

Using SA's

How to contact a UC

How to find messages

User who had been using system without reading docummentation wondered why he had received no answers yet to his messages.

How to enter Directory description

HOurs of operation

HOw to set up a private conference

User from abroad sent a letter with transcript showing problem. A minus sign as first character was preventing entry of item.

User lost in system. Kept getting the same question (Modify item #) and did not knowhow to answer it.

How do I correct errors??

How transfer a short paper from SA's to a conference

How to get into a conference

Can a user consultant be reached by telephone?

How to delete a message

How to erase the SP

What is the meaning of "associated comment?"

What happens during disconnects?

Wha to do when the system crashes

What does rolled mean?

Deleted too many items from a conference. Can they be put back?

Right margin wrapping around

Why doesnt TELENET type a disconnect?

Why does my terminal error light go on?

HOw do I get to the end of the message when I am finished editing?

Why does my phone disconnect every five minutes?

Why cannot my nickname be X (It was taken)

How to delete a gorup message

How do I find my messages?

How do I get a notebook?

Can youlist conference commments backwards, starting with the most recent?

Where is there a dictionary of commands?

WAnts not to receive messages previously selected from waiting queue

MIssing ends of lines (incorrect right margin setting)

Note that in many cases the problem descripton is so vague and confused that the user consultant must first find out excatly what is the matter, or suggest several possible diagnoses and treatments.

Leaders and Facilitators of New Groups

SEtting up groups and conferences-3

Getting a listing of class one vs. class 2 and time allocated and left

MOving users from class 1 to class 2

What is the 800 number for TELENET?

Confusion in adding people to conference vs. group

Difference between a group coordinator and a conference moderator

What does rolled mean?

Use of Link

HOw to get into c1008

Trying to send a message to a conference..

Double letters printing

How to use Search choice

Setting .tabs

How to put an item in both notebook and group message

Why is repsonse to ++6,5,5, and ++6,5,9 similar?

How to send a gorup message

Overflowing lines

WHy did a participant who received conference items get shown as none read?

Note that the requests listed first are probably peculiar to the duties and problems of a group leader or facilitatior, while the rest are much like the questions of other new users.

Experienced Users

Resetting conference markers-7

How to get old Chimos-6

Request for setting form feed page controls-3 (coming soon; +lines command)

Problem with writing Interact program -3 (same user with 3 different problems)

(NOte: most questions and answers on interact are taking plac e in conferences devoted to specific design efforts)

How to get GAPC to work (+spcm)-2

Time expiration ("I am being banished from society.") -2

How to enter executable lines into the SP

Getting proper margin controls

Using SA's

??? request of the month:" Fire here and my house is threatened.Please msg me when you "

people brokering

explaining norms of use of system

Pen names vs. nick names

.endtext vs .notext

How to underscore

Travelling user wanted local TELENET number

How to use comands to get SA's (you cannot)

How to get an off line printing of a three months backlog? (system monitor said he'd do it)

Deleting and adding conference members

Changing the name of a conference

Evaluator wanted more detailed usage stats for his group

Retrieveing lost conference comments

double printing

+doctor seems to behave in a bizarre manner

wants +linl to work correctly

edinting items

experiment with batch input with paper tape

Trouble with defined command

Can members be searched by pen name? (no)

Can the system be searched for all exist8ng conferneces? (no)

Modify keys

conference status review

How to send a message toa long list of addressees

Regreiving old messages

Request for search choice

receipt of a message in the queue was causing problems

trouble with +get

Can a copy of a very old message be retrieved from tape archives?

How to get into somebody else's notebook

Did not understand prompt at modify items choice

changing conference membership

batch input from smart terminal

How to see who's on line in the middle of a sessiion?

Note that some of the things requested by users would involve severe invasion of the privacy of others if such features were available

Bugs reported to User Consultants

+News delivered part of a proc

Part of a message ended up garbled into the end of lines in a comment being edited

gwci not working correctly'

++7,2 gave incorrect info

qot conference choice when replied y to "accept new items?"

EIES sending out stray characters

(non-human)

Inconsistent gwci break behaviour

++6,8 caused error message

Wrong answer to ?? prompt at pen name choice

APPENDIX F

Pre-Use Questionnaire
Study of the Impact of Computer Based Communication on Scientific Research Communities

To: ______________________
From: Starr Roxanne Hiltz

I am a Sociologist currently supported by the Division of Mathematical and Computer Science of the National Science Foundation to carry out a study of several groups of scientists who are using computer based communication systems. The principal investigator for your group, Dr. Lawrence H. Landweber, has given permission for me to include your Network for Theoretical Computer Science, using the MACC TELEMAIL system, in the study.

The purposes of this study are to discover:

What reactions do you as an individual have to this form of communication? Why will some of you use it much more than others?

What effect does use of the system have on your user group and your research specialty as a whole?

What changes in the system itself seem advisable, based upon your group's experiences?

The study will include three questionnaires — before use, at 3 to 4 months after startup, and at the end of the project. Each one will have been pre-tested and take the average person about 30 minutes to complete. I will also try to discuss the project with some of you on a more open-ended basis, either in person or on the telephone, or over the system (Roxanne=Hiltz). Attached is a short vita to introduce myself; I will be glad to send reprints of any of my previous articles in this area if you are interested.

Please be assured that all information collected will be treated as confidential. Note, for instance, that this cover sheet will be removed before coding. Your name or identifying information will not be used in any reports. However, a copy of the data, with the name removed and only an ID used, will be made available to Dr. Landweber for his use in the final report on your project.

Completion of this questionnaire or participation in any other phase of the evaluation project is completely voluntary and in no way conditions your participation in the TELEMAIL project itself. You may refuse to answer any question, and you are free to withdraw from participation at any time. I will be glad to answer any inquiries about the study.

Because of the protection of human subjects regulation under which I work, it is necessary for me to have your SIGNED STATEMENT OF "INFORMED CONSENT" (this page) returned with your completed questionnaire.

STATEMENT OF INFORMED CONSENT

I have read the above and I agree to participate in this study.

______________________ ____________
Signature Date

Part I. Your User Group's Research Specialty (I.D. ____________) CARD 1/COL

1. What is the approximate year in which this specialty became recognized (or will become recognized) as a separate and distinct research area? ____ 16

____
1 = 5-19 years
7 = 10-19 years

2. For approximately how long have you been actively working within this specialty area? ____________ ____ 17

4 = 5-9 years
4 = 10+ years

3. What is the total number of journals in which articles relevant to your specialty area are likely to appear? ____ 18

(1) 0 none
(2) 0 two or less
(3) 7 3 - 10
(4) 1 11 - 19
(5) 0 20 - 49
(6) 0 50 - 99
(7) 0 100 or more

4. Is there any journal or newsletter or other published source in which you can find descriptions of current (unfinished) research activities and developments within your specialty? ____ 19

(1) 8 No

(2) 0 Yes: please list: ____________

5. Are there any meetings or conventions which you "must" attend in order to keep up with research in your specialty? (IF yes, please list). ____ 20

(1) 0 No (2) 8 Yes (____________)

6. Could you list the four major or outstanding people in your entire specialty and the extent to which you know them personally and/or are in direct contact with them? ____ 21

____ 22

Extent of Current Contact ____ 23

	Constant	Frequent	Occasional	Rare	Never	
						____ 24
a. ____________	1	2	3	4	5	____ 25
b. ____________	1	2	3	4	5	____ 26
c. ____________	1	2	3	4	5	____ 27
d. ____________	1	2	3	4	5	____ 28

CARD/COL

8. Considering all current personal communication modes, what is the total number of different individuals within your research specialty with whom you are currently in contact?________ 2/21 ____

7-8 = 2
11 = 2
13-15= 2

9. How many of these are in your computer communication system user group?________ 2/22 ____

10. Is there a commonly accepted "intellectual mainstream" in your specialty? 1/33 ____

(1) 7 Yes (2) 0 No

11. If yes; to what extent do you feel that you and those with whom you collaborate are in the recognized intellectual "mainstream" of your specialty, or conversely feel you are "isolated" or "peripheral"? (circle one) 1/34 ____

Completely in the Mainstream	Somewhat in the Mainstream	Neither in the Mainstream nor Isolated	Somewhat Isolated	Completely Isolated
1	2	3	4	5
3	5	0	0	0

12. How would you rate the degree or intensity of competition within your research specialty? 1/35 ____

Very Intense	Intense	Moderate	Low	Nonexistent
1	2	3	4	5
1	2	4	1	0

13. What are the reasons for this competition? (Check all that apply).

4	Scarcity of or competition for funds	36 ____
3	Rival groups of collaborators	37 ____
6	High achievement or success drive of persons in the field	38 ____
0	Some persons act unethically	39 ____
0	Strongly opposing views	40 ____
1	Other (please describe) :	41 ____
____	____________	

14. Please list the name of any other research specialties in which you are currently involved, and whether you are currently spending more time or less time on each one than on your user group's specialty.

Name	More time	Less time	
			42 ____
none = 1			43 ____
less time = 2			44 ____
more time = 2			45 ____

Part II. Your Work Patterns and View of Your Specialty

1. During an average week, approximately how many hours do you spend on each of the following kinds of activities? (First list the total for all professional activities, then the number of these related only to activities within your specialty area).

	means	
	Total	Hours in Specialty only
Direct research activities	10.0	5.6
Writing papers, books, etc.	8.1	6.0
Education	10.9	3.6
teaching		
learning: reading books or journals	4.5	3.0
attending meetings, seminars, etc.	3.9	2.0
Administrative and support activities (committee meetings, memos, etc.)	4.9	0.25
Telephone		
inside your organization	0.5	0.25
outside your organization	2.4	2.0
Consulting	1.5	5.9
Funding (grants applications or other resource acquisition activities)	2.5	1.4
Other professional activities (please specify)	2.4	0.37
Total	51.6	24.9

2. Please list the names of any persons with whom you have co-authored or collaborated in research during the last year (1977-78). 2/20 ____

median = 4.0

3. Scientists are sometimes anticipated by others in the presentation of research findings. That is, after they have started work on a problem another scientist publishes its solution. How often has this happened to you in your career? (Please exclude cases where a solution to your problem was published *before* you started your own work. Circle one.)

Constantly	Frequently	Time to Time	Rarely	Never	
1	2	3	4	5	2/23 ____
0	0	6	2	0	

4. How concerned are you that you might be anticipated in your current work?

Constantly	Frequently	Time to Time	Rarely	Never	
1	2	3	4	5	2/24 ____
0	2	4	1	1	

CARD 2/CO

General Principles of Science

Described below are two sets of conflicting general principles which can guide the conduct and evaluation of scientific research. Please read each set of principles with your specialty area in mind.

Principle A. Emotional Neutrality

Scientists must be emotionally neutral and impartial towards their ideas if they are to stand a fair chance of ultimately being proved valid. Conducting an investigation with anything less than an impartial frame of mind possesses the danger that the scientist will bias results and be unable to give up hypotheses when they are indeed false.

Principle B. Emotional Commitment

Scientists must be emotionally committed to their ideas if they are to stand a fair chance of ultimately being proved valid. Unless a scientist believes intensely in his or her own ideas and does everything legitimately in his power to verify them, there is the danger that he will give up his ideas too quickly. Initial inconclusive signs of negative evidence do not warrant a reorientation of research efforts. The scientist must believe in himself and his own findings with great conviction.

5. On the basis of your own experience and observations, to what extent does each of the principles tend to govern the everyday working behavior of most scientists in your specialty? (Please circle one number).

A Significantly More Than B	A Moderately More Than B	Both Tend to Govern Equally	B Moderately More Than A	B Significantly More Than A	Neither Tends to Govern
1	2	3	4	5	6
0	0	2	4	1	1

2/25 ____

6. To what extent does each of these principles tend to govern your own everyday working behavior?

A Significantly More Than B	A Moderately More Than B	Both Tend to Govern Equally	B Moderately More Than A	B Significantly More Than A	Neither Tends to Govern
1	2	3	4	5	6
0	0	2	4	0	2

2/26 ____

Principle C: The Irrelevancy of Personal Attributes

The personal attributes of a scientist are completely irrelevant in judging results and claims to knowledge. Each claim in science is judged impartially on its own merits by its ability to stand up to rational, empirical test procedures without reference to the particular scientist.

Principle D: The Relevancy of Personal Attributes

The personal attributes of a scientist are highly relevant in judging results and claims to knowledge. In reality the work of some scientists is given credence over that of others. It is necessary to know the personal characteristics, background and motivations of a scientist before one can properly evaluate his or her work.

As above, we wish you to indicate the extent to which these two principles tend to govern the everyday working behavior of most scientists in your specialty; tend to govern your own everyday working behavior, and ought to govern the behavior of scientists in your specialty.

	C Significantly More Than D	C Moderately More Than D	Both Equally	D Moderately More Than C	D Significantly More Than C	Neither	
Most scientists	1	2	3	4	5	6	28 ____
	0	3	4	1			
Your own behavior	1	2	3	4	5	6	29 ____
	0	1	2	4	1	0	
Ought to govern	1	2	3	4	5	6	30 ____
	2	2	1	2	1	0	

I am more interested in generating a large number of alternate explanations for any problem than in pursuing one exclusively in detail.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	
1	2	3	4	5	68 ____
0	3	4	1	0	

I prefer to work in well-established research areas.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	
1	2	3	4	5	69 ____
1	3	4	0	0	

How well known is your work, within your specialty area?

1	2	3	4	5	6	7	70 ____
Practically unknown			Average			Ranked at top of Field	
0	1	1	2	1	3	0	

Part III Background Items CARD 2/COL

1. What is your age?

(1) 0 under 25 (4) 0 45 - 54
(2) 7 25 - 34 (5) 0 55 - 64
(3) 1 35 - 44 (6) 0 65 & over 31 ____

2. Sex: (1) 2 female (2) 6 male 32 ____

3. Please list your highest academic degree (Degree, Subject, and year). 33 ____

Ph. D. = 8

years since degree:
2 = .5
5 = 5-9
1 = 10+

4. Professional Publications (please try to give exact numbers published in last year or underway; estimates are fine for previous works.)

(38-54)

	Currently in Progress	Published in Last Year	Published or Presented during Total Professional Career
Text books	.9	0	.1
Other books	.1	.2	.1
Journal articles	5.0	3.0	8.1
Papers presented	1.4	2.3	12.8
Other (describe)	.5	1.2	2.5

IV Communication Skills and Facilities

CARD 3/COL
1-4 ____

1. Is English your primary language? — 5 ____

(1) 8 Yes (skip to question 2)
(2) ____ No
If not, what is your first language? ____________________

If English is not your first language, do you consider your English to be on a par with your primary language as to;

Writing	(1) ____ Yes	(2) ____ No	7	____
Speaking	(1) ____ Yes	(2) ____ No	8	____
Reading	(1) ____ Yes	(2) ____ No	9	____

2. How would you describe your English reading speed? — 10 ____

(1) 1 Very fast
(2) 6 Fast
(3) 1 Slow
(4) 0 Very slow

3. Comparing your writing skills and your speaking skills, would you say you were more persuasive when

(1) 5 Writing (2) 3 Speaking — 11 ____

4. How would you describe your typing skills? — 12 ____

(1) 0 None
(2) 0 Hunt and peck
(3) 3 Casual (rough draft with errors)
(4) 2 Good (can do 25 w.p.m. error free)
(5) 2 Excellent (can do 40 w.p.m. error free)

5. I think computers are — 13 ____

1	2	3	4	5	6	7
Wonderful			(neutral)			Terrible
1	4	1	0	0	0	0

6. Have you used computers in a batch mode for (check all applicable)

(1) ____	Have not used them	14	____
(2) 3	Information retrieval	15	____
(3) 7	Writing programs	16	____
(4) 5	Running existing programs	17	____
(5) ____	Other (specify) ____________________	18	____

7. Have you specified programs to be written by someone other than yourself?

(1) 8 Yes (2) ____ No — 19 ____

CARD 3/COL

8. Have you ever utilized a computerized message system, tele-conferencing or computerized conferencing system? 20 _____

(1) 5 Yes (2) 2 No 21 _____

(If yes, please indicate below which systems you have used).

How often have you used computer terminals for: (Check one)

	Never (1)	Occasionally (2)	Frequently (3)	
9. Text editing	1	2	5	22 _____
10. Information retrieval	1	6	1	23 _____
11. Programming	0	5	3	24 _____
12. Packaged analysis programs	5	3	0	25 _____
13. Data entry	5	3	0	26 _____
14. Game playing	2	5	1	27 _____
15. Other (specify)	7	0	1	28 _____

16. Have you ever utilized, on a regular basis, a TWIX or like communication system? 29-30 _____

(1) 0 Yes (2) 8 No 31 _____

17. Please describe your access to a computer terminal at your office or place of work. 32 _____

(1) 0 No terminal
(2) 6 Have my own terminal
(3) 2 Share a terminal

If shared:

17a. On the average, how long does it take you to get to the terminal?

4 Minutes 33 _____

17b. On the average, how long must you wait for someone else to get off the terminal before you can use it?

4 Minutes 34 _____

CARD 3/COL

18. Do you have a terminal which you keep at home?

(1)___3___ Yes

(2)___3___ No 37 _____

18a. If no: Is there a terminal available to you that you can take home?

(1)___2___ Yes

(2)_______ No

19. What types of terminals do you have access to? (Check all that apply)

1) _____ Hard Copy 38 _____

a) Speed:

_____ 10 _____ 15 __6__ 30 characters/second or more

b) Weight:

__3__ Under 20 lbs. _____ between 20 & 40 lbs. 39 _____

__3__ over 40 lbs. 40 _____

2) __2__ Visual Display (CRT)

20. I would not trust computer storage of paperwork that I use daily. 41 _____

___0___ Strongly agree

___2___ Agree

___3___ Disagree

___3___ Strongly disagree

Current Expectations
About the Computer Mediated Communication System

1. (a) Concerning the user documentation , check one of the following 42 ____

(1) 1 Did not receive a manual
(2) 3 Received, but haven't read it
(3) 3 Found it easy to understand
(4) 0 Found it hard to understand
(5) 1 Read it, but can't evaluate it

(b) Is there any part of the documentation you had difficulty understanding? (Please be as specific as possible, listing page or section number.) Is there anything that you felt was left out?

2. Which features of the System do you anticipate as being most useful to you? (Please rank multiple selections 1,2,3 etc.)
(ranked #1)

(1) 7 Private messages between individuals 43 ____
(2) 0 Group discussion and conferencing 44 ____
(3) 0 Text editing features 45 ____
(4) 0 Personal notebooks 46 ____
(5) 0 Dissemination of Research Announcements 50 ____
(6) 0 Other (specify) ____________ 51 ____

3. How much time in the average week do you foresee yourself using the system?

(1) 1 30 minutes or less
(2) 2 30 minutes to 1 hour
(3) 3 1 - 3 hours
(4) 1 3 - 6 hours
(5) 1 6 - 9 hours
(6) 0 9 hours or more

CARD3/COL

4. How often do you foresee yourself signing on the system to send or receive messages or discussion comments?

(1) 0 Once a month or less
(2) 1 2 - 3 times a month
(3) 1 Once a week
(4) 2 Two or three times a week
(5) 3 Daily
(6) 1 Several times a day

52 ______

5. Do you anticipate entering the material into the System yourself or having someone else do it for you?

(1) 7 Type it myself
(2) 0 Have it typed
(3) 1 Both will occur

53 ______

6. How strong is your motivation to participate in this system?

1	2	3	4	5	54 ______
Very Strong				Very Weak	
4	3	0	1	0	

7. Which of the following best describes your anticipation of the system's worth? (please check only one) 55 ______

(1) 1 I think it will be useless
(2) 0 I think it is useful for others, but not for me
(3) 1 I am skeptical about it but willing to try it
(4) 0 I am basically indifferent or neutral
(5) 0 I think it will have limited, but some worth for me
(6) 4 I think it will be useful in many respects
(7) 1 I think it will revolutionize my work/communication processes
(8) 1 It depends (specify) ______________________

8. Which of the following do you feel will limit your probable use of the system? (If more than one applies, rank them 1,2,3, etc.)
(ranked #1)

(1) 0 Inconvenient terminal location 56 ______
(2) 2 Preference for face-to-face communication 57 ______
(3) 1 Preference for telephone communication 58 ______
The people I wish to communicate with are not 59 ______
(4) 1 on the system 60 ______
(5) 0 Typing skill or lack of a typist 61 ______
(6) 0 Not enough time 62 ______
(7) 2 System too cumbersome or difficult 63 ______
(8) 0 General dislike for computers 64 ______
(9) 0 Prefer drafting by longhand or dictation 65 ______
(10) 1 Other (specify) ______________________

9. Compared to the conventional means of communicating with your group, do you expect the computer system to 66 ______

(1) 2 Involve less of your time
(2) 3 Involve more of your time
(3) 3 Involve the same amount of time

Now, please fill in the enclosed "social ties checklist". First read the category (ex: unfamiliar to me.") Then, turn the paper sideways and put an "X" in the box for every name to which the phrase appears.

10. How do you think use of the system will change your communications or work patterns? (Please be specific. What current activities would it replace?)

11. Why do you personally wish to use the system? (What do you think you, or your group, or the society, can gain from it?)

12. What disadvantage or negative consequences might possibly flow from your group's use of the system?

13. Any other comments?

14. How long did it take you to fill in this questionnaire? __________

76-78 _____

79-80 _____

THANK YOU VERY MUCH

Continuation Page

Continuation of Question # ____

Continuation of Question # ____

Continuation of Question # ____

Continuation of Question # ____

Continuation of Question # ____

	LEN=ADLEMAN	RICK=ADRION	MANUEL=BLUM	GEORGE=DAVIDA	RICH=DEMILLO	DAVID=DOBKIN	MIKE=FISCHER	EMILY=FRIEDMAN	MIKE=HARRISON	ROXANNE=HILTZ	DICK=KARP	RICHARD=LADNER	LARRY=LANDWEBER	DICK=LIPTON	NANCY=LYNCH	CHRIS=PAPADIMITRIOU	VAUGHN=PRATT	BOB=RITCHIE	RON=RIVEST	ED=ROBERTSON	LARRY=SNYDER	KEVIN=WILKINSON
UNFAMILIAR (NOT KNOWN) TO ME																						
PEOPLE I CONSIDER FRIENDS																						
CLOSE, PERSONAL FRIENDS																						
AUTHORED BOOKS, ARTICLES, OR PAPERS THAT I HAVE READ																						
FELLOW STUDENTS WITH ME																						
TEACHERS OF MINE																						
STUDENTS OF MINE																						
WORK OR HAVE WORKED AT THE SAME INSTITUTION																						
WORKED ON A PROJECT TOGETHER																						
CO-AUTHORED WITH																						
MET FACE-TO-FACE																						
CORRESPONDED THROUGH THE MAIL																						
TALKED WITH ON THE TELEPHONE																						
TALKED TO AT CONFERENCE OR AT A MEETING																						
COMPUTER CONFERENCED WITH																						

APPENDIX G

Study of the Impact of Computer Based Communication on Scientific Research Communities

by Starr Roxanne Hiltz, Ph.D.

To ____________________

I am a sociologist currently being supported by the Division of Mathematical and Computer Science to carry out a study of several groups of scientists who are using computer based communication systems. The principal investigator for your group, Dr. Lawrence H. Landweber, has given permission for me to include your Network for Theoretical Computer Science, using the MACC TELEMAIL system, in the study.

The purposes of this study are to discover:

What reactions do you as an individual have to this form of communication? Why will some of you use it much more than others?

What effect does use of the system have on your user group and your research specialty as a whole?

What changes in the system itself seem advisable, based upon your groups's experiences?

In pre-tests, this questionnaire took about 15 minutes to complete, so please grant us this much of your time and complete and return it as soon as possible. If there are any questions, you may send me a message (Roxanne=Hiltz) or call me at 201-232-6652.

Please be assured that all information collected will be treated as confidential. Note, for instance, that this cover sheet will be removed before coding. Your name or identifying information will not be used in any reports. However, a copy of the data, with the name removed and only an ID used, will be made available to Dr. Landweber for his use in the final report on this project.

Please be assured that completion of this questionnaire or participation in any other phase of the evaluation project is completely voluntary and in no way conditions your participation in the TELEMAIL project itself. You may refuse to answer any question, and you are free to withdraw from participation at any time. I will be glad to answer any inquiries about the study.

Because of the protection of human subjects regulation under which I work, it is necessary for me to have YOUR SIGNED STATEMENT OF "INFORMED CONSENT" RETURNED (this page), in order to process your answer.

I have read the above and I agree to participate in this study.

________________________ ____________
Signature Date

COL-CODE

I. ACCESS & USE PATTERN

1. What are the main activities you have been engaging in on the system, and with whom?

1-4 _____

2. Does anyone else use the system under your ID? If so, please give their name and approximate on-line time per week.

5 _____

yes = 1

3. In an average week, how many times do you personally "log in"? Approximately how long do you usually spend per session?

6-8 _____

9-10 _____

11-12 BB

13-14 _____

15-16 BB

minutes/week	
11	4
12-15	3
20-30	6
50+	5

_____________ Average # sessions per week

_____________ Minutes per average session

4. How much time do you spend "off-line" in an average week doing related work (preparing entries, filing material received, etc).

____

17-19 _____

5. Of the time spent on the system what proportions do you spend at your office, at home, or at other locations?.

20-21 _____

22-23 _____

24-25 _____

_____________ % at office

_____________ % at home

_____________ % Other (describe)

100%

COL/CODE

6. What do you do with the print-outs of material?

25 _____ 1) __2__ Throw them all out.

2) __0__ Keep them all.

3) __5__ Save selective entries in a single file or pile

4) __0__ Save selective entries in separate files (please explain filing system below: by subject, author, group, or what).

5) __9__ I use a CRT and do not generate print-outs

6) __2__ Other (Please describe)

26-27 _____ 7. How many different people do you feel you are actually exchanging information or communicating with on this system, currently? _____

28-29 _____ 8. Of these, how many have you "met" (gotten to know) over the system? _____

30 _____ 9. Have you sent transcripts or other material to persons outside the system, invited other persons to be informal "observers" or otherwise expanded participation beyond your user group? (please explain).

yes = 2
no = 14

31 _____ 10. At the present time, which of the following best describes your group?

__3__ More of a collection of individuals than a research community
__6__ A set of cliques or subgroups with interests and activities in common, but not an integrated community
__3__ A well integrated research community that shares many interests and activities in common

COL/CODE

II. OVERALL REACTIONS TO THE MODE OF COMMUNICATION

These questions relate to your overall reactions to the system at this point, as a means of communication and work coordination for your user group. They consist of a number of rating scales on which you are to circle one number which corresponds to where you would place your own impressions of the system on that dimension. For example, here is the first scale:

1. Overall, the communication system is

1	2	3	4	5	6	7	32 ____
Extremely Good			Neutral			Extremely Bad	
1	5	7	2	2	0	0	mean=2.9

If you think that the system is extremely good, you should circle 1. If you think the system is quite good, you should circle "2"; 3 would mean that the good aspects slightly outweigh the bad aspects. "4", the middle point, should be checked only when the words at the two ends of the scale describe the system equally well. Continuing on, "5" would mean that you feel that the bad aspects slightly outweigh the good aspects, etc.

I find using the system to be

2.

0	2	4	9	2	1	1	
1	2	3	4	5	6	7	33 x=3.9
Stimulating			Neutral			Boring	

3.

1	4	9	3	1	1	0	
1	2	3	4	5	6	7	34 x=3.1
Productive						Unproductive	

4.

0	4	5	4	3	1	2	
1	2	3	4	5	6	7	35 x=3.9
Great Fun						Unpleasant Work	

5.

5	6	7	0	1	0	0	
1	2	3	4	5	6	7	36 x=2.3
Time-Saving						Time-Wasting	

6.

4	2	0	4	5	2	2	
1	2	3	4	5	6	7	37 x=3.9
Not Frustrating						Frustrating	

COL/CODE

38 x=3.9 7.

1	3	2	3	1	3	1
1	2	3	4	5	6	7
Friendly						Impersonal

39 x=2.9 8.

4	4	4	4	2	1	0
1	2	3	4	5	6	7
Easy						Difficult

Does using the system become so demanding of your time and energy that it intrudes upon your capacity to engage in other professional or personal activities?

40 x=1.4 9.

16	0	2	1	0	0	0
1	2	3	4	5	6	7
Not demanding or Intrusive						Very demanding or Intrusive

41 _____ 10. When you send a message over the system rather than writing or telephoning, would you say that recipients are generally

1) 8 More responsive to an electronic message.
2) 4 Less responsive
3) 6 No difference

42 _____ 1. What is the attitude of your spouse, children, or other persons with whom you live towards your use of the system?

43 _____ 2. Which statement best describes your present reaction to the system? (Please check only one)

1) 0 I think it is useless and should be discontinued
2) 0 I think it has its uses for others but not for me
3) 0 I am skeptical but am giving it a try
4) 0 I am basically indifferent or neutral
5) 9 I think that it has certain worthwhile uses for me
6) 9 I think it is very useful in many respects
7) 1 I think it is revolutionizing my work/communications processes.

III. REACTIONS TO SPECIFIC FEATURES OF THE EIES SYSTEM

COL/CODE

1. How valuable or useful do *you* currently find each of the following features or capabilities for your own communication activity? If you have not actually used a feature, please check "cannot say").

	1 Extremely Valuable	2 Fairly Useful	3 Slightly Useful	4 Useless	5 Cannot Say	
Private Messages	10	6	3	0		44 ____
Group Messages	5	6	6	1	1	45 ____
Group Conferences	0	2	3	12	3	46 ____
Files	0	4	5	4	6	47 ____
Text Editing	0	3	6	5	5	48 ____
On-Line Explanations	0	7	4	0	8	49 ____

Comments or suggestions about improving these features or desirable new features?

COL/CODE

2. Did someone demonstrate the system to you in person or did you learn from the written materials?

1-4 _____ 1) 6 live teacher
5 _____ 2) 13 written material only

6-7 _____ 3. How long did it take you to learn to use the system reasonably well?

Median=1.3 hours

4. Do you now find "the documentation" (on a scale of 1 to 5)

		7	5	0	2	0	
8 _____	a) understandable	1	2	3	4	5	not understandable
		7	2	3	2	0	
9 _____	b) easy to read	1	2	3	4	5	hard to read
		6	2	3	3	0	
10 _____	c) well organized	1	2	3	4	5	not well organized

11 _____ 5. Suggestions for improvement of the Documentation.

6. How would you rate the performance of your group leader?

		5	4	1	0	0
12 _____	Excellent (principal investigator)	1	2	3	4	5

7. Do you find the language of the system understandable?

		4	7	5	2	1	
13 x=2.4	a) Understandable	1	2	3	4	5	Confusing
14 x=2.8	b) Courteous	1	2	3	4	5	Inhuman
		2	4	8	3	1	

8. Do you find the use of the editing commands to be

		1	3	5	4	2	
15 x=3.2	Easy to remember	1	2	3	4	5	Hard to remember
16 x=3.1	Easy to use	1	2	3	4	5	Hard to use.
		1	3	5	4	1	

Comments?

COL/CODE

10. Thinking back over your experiences so far with the system, how frequently have you felt..(check one)

		1 Always	2 Almost Always	3 Some-times	4 Almost Never	5 Never
17 x=3.3	Distracted by the mechanics of the System	0	1	12	5	1
18 x=3.1	Constrained in the types of contributions you could make	2	4	6	3	3
19 x=4.1	Overloaded with information	0	0	2	12	4
20 x=2.1	Able to express your views	4	5	4	1	0
21 x=2.2	Able to get an impression of personal contact with other participants	3	10	1	3	0

11. How satisfactory do you think the system is for the following activities?

		COMPLETELY SATISFACTORY						COMPLETELY UNSATISFACTORY
		1	2	3	4	5	6	7
22 x=2.0	Giving or receiving information	5	8	5	0	0	0	0
23 x=4.0	Problem solving	0	5	1	5	3	1	2
24 x=4.4	Bargaining	0	1	2	4	2	0	2
25 x=3.8	Generating ideas	1	3	4	5	1	1	4
26 x=4.3	Persuasion	1	1	2	3	1	2	2
27 x=3.5	Resolving disagreements	2	5	2	1	2	1	2
28 x=4.6	Getting to know someone	0	2	3	1	5	1	4
29 x=3.2	Giving or receiving orders	1	4	2	4	5	0	0
30 x=1.9	Exchanging opinions	6	8	1	2	0	0	0

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PLEASE PLACE A CHECK MARK OR X IN THE APPROPRIATE BOX TO INDICATE WHETHER EACH OF THE FOLLOWING FACTORS HAS BEEN VERY IMPORTANT, SOMEWHAT IMPORTANT, OR NOT IMPORTANT AT ALL IN LIMITING YOUR USE OF THE SYSTEM.

REASON	VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT	COL/CODE
				1-4 ____
INCONVENIENT ACCESS TO A TERMINAL	6	2	10	5 ____
DOCUMENTATION LOOKED INADEQUATE OR DIFFICULT	1	6	10	6 ____
THE SYSTEM IS TOO COMPLICATED	2	4	11	7 ____
TROUBLE WITH TELENET	3	6	9	9 ____
COST OF TELEPHONE OR TELENET	1	3	14	10 ____
TROUBLE WITH TELEPHONE CONNECTION	2	5	11	8 ____
HAD SOME BAD EXPERIENCES (SYSTEM CRASHED OR DID NOT SEEM TO WORK CORRECTLY)	5	3	10	11 ____ 12 B
I DO NOT LIKE TO TYPE	0	1	17	13 ____
I DO NOT LIKE USING A COMPUTER SYSTEM LIKE THIS	0	2	16	14 ____
THERE IS NO ONE ON THIS SYSTEM WITH WHOM I WISH TO COMMUNICATE A GREAT DEAL	0	6	11	15 ____
I AM NOT VERY INTERESTED IN THE SUBJECTS BEING DISCUSSED	1	0	17	16 ____
OTHER PROFESSIONAL ACTIVITIES MUST TAKE HIGHER PRIORITY	1	3	14	17 ____
THE MESSAGES I HAVE RECEIVED DO NOT SEEM WORTH READING	0	4	14	18 ____
INADEQUATE LEADERSHIP OF THE GROUP	0	1	15	19 ____
OTHER (PLEASE DESCRIBE)	3	3	3	20 ____

NOW, PLEASE GO BACK AND CIRCLE THE SINGLE MOST IMPORTANT FACTOR. -21-22 ____

COMMENTS OR EXPLANATIONS?

V. Conclusion

1. Are there any ideas which you are using or working with at present, which you first learned of on the system? (Please try to be specific about what you read and what impact it has had on your work).

2. Are you working on any projects or papers at the present time which have been advanced by your use of the system? (Again, please try to give us some specific details.)

3. Are you coauthoring or collaborating closely with any members of your group at the present time, using the system? If so, please describe who you are collaborating with, on what, and how you are using the system in this effort.

4. Are there any "new uses" you have invented for the system, that are helping you in your work? These uses might not be related to the specific purpose of your group, but we would like to know about them. For example, you might use it to communicate with your family while away on business trips. To coordinate face to face meetings or conferences with other members...

5. Overall, what would you say have been the main negative aspects of use of the system for your group this far? What things that you wish to accomplish, have not occured, or what undesirable things have occured, that might be attributed to characteristics of communication over the system? Please explain as fully as possible.

6. What tasks or activities can you suggest for your group on the system, to motivate participation?

7. How long did it take you to complete this questionnaire?________________

Any additional comments?

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APPENDIX H

EXAMPLES OF COMPUTERIZED REMINDERS AND THANK YOUS

1. REMINDER MESSAGES

****** A GENTLE REMINDER*****

I have not yet received your follow-up questionnaire.
If it is in the mail, thank you.
If you have not received one or need a new one, please message me.
And if it is just lying around, won't you please take about twenty minutes and fill it out?

Anxiously yours,
Roxanne

PLEASE please PLEASE please PLEASE please
Will you take a look around and see if you have the EIES questionnaire we sent to you awhile back? If so , please take a few minutes to complete and return it to us so we may keep a systematic record of your reactions to the use of the system. If you do not have it available, message 974 for another, please. Thank you. (And may the system always go well for you) MA

2. ON-LINE THANK YOUS

```
                                   *
                                  * *
                                 *   *
                                *     *
                       *********       **********
                         * GOOD PEOPLE AWARD    *
                            *              *
                              *          *
                             *     *      *
                            *   *     *    *
                           *  *         *   *
                          *                  *


 Presented in Appreciation of your Outstanding Questionnaire-Completion
                           Efforts


TTTTTTT  AAAAAAA        DDDDD    AAAAAAA  !
   T     A     A        D    D   A     A  !
   T     AAAAAAA  ---   D     D  AAAAAAA  !
   T     A     A        D     D  A     A  !
   T     A     A        D    D   A     A
   T     A     A        DDDDD    A     A  !



CCCCC  OOOOO  N   N  GGGGG  RRRRR  AAAAA  TTTTT  SSSSS  !
C      O   O  NN  N  G      R   R  A   A    T    S      !
C      O   O  N N N  G  GG  RRRRR  AAAAA    T    SSSSS  !
C      O   O  N  NN  G   G  R R    A   A    T        S
CCCCC  OOOOO  N   N  GGGGG  R  R   A   A    T    SSSSS  !

 YOU HAVE COMPLETED YOUR LAST QUESTIONNAIRE!  WELL DONE!
YOU can feel very proud; you are an EIES member in good standing.
WE can relax; we have your data. Thank you.
                          *                  *
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APPENDIX I

SELECTIONS FROM THE TRANSCRIPT OF THE "TELENET EXPERIENCES" CONFERENCE

:C1011 CC1 ART KLEINER (ART,866) 4/21/80 9:29 PM L:11
(ORIG.) 4/21/80 6:33 PM L:2
KEYS:/WELCOME TO "TELENET EXPERIENCES"!/

Welcome to C1011, Telenet Experiences. If you have problems with Telenet service, or wish to say something positive or negative about Telenet's transmission, please enter a comment here. This conference will be printed out and mailed to Telenet's offices and to members of the Telenet User's Group. As we learn more specifics about THAT process, we will let you know here as well. There will also be an effort to copy in comments about Telenet made elsewhere in the system.

I will be happy to answer any questions. -- Art, 866.

(PS - It may interest you to know that I was disconnected by Telenet twice while attempting to enter this comment.)
:C1011 CC3 CHARLES WILLARD (CHARLES,846) 4/21/80 9:14 PM
L:11
KEYS:/MORE GUIDELINES ON CONTENTS REQUESTED/

I had a somewhat similar experience to Art's (cf. CC2). I guess that the question that I have is whether it is intended that this conference should be the place where routine, although troublesome, experiences are reported -- I recall that there was a request in CHIMO recently for reports of freeze problems to be reported to EIES. Do you want a diary of troubles or only the big ones?

In picking up from the earlier note about troubles even while working on this conference, it is especially unnerving, when I find that I am frozen online and then run through the routine of hanging up and redialing, to be told by EIES: SORRY, THAT ID IS IN USE. CONNECTION TERMINATED.
:C1011 CC4 ART KLEINER (ART,866) 4/21/80 9:29 PM L:9
KEYS:/GUIDELINES/LET'S SEE HOW GUIDELINES EMERGE AS WE KEEP REPORTING WHAT HAPPENS HERE/
A: 3

Charles, you won't want to report EVERY incidence of Telenet hassle here; but you WILL want, after 2 weeks of chronic problems or something similar, to say you've experienced two weeks of chronic problems. Report what you feel is worthy of note. We may at some point ask for brief responses to get some idea of how OFTEN a particular malfunction is happening. But for right now we know they are happening often; we need 1) proof, in the form of many different people expressing their experiences, and 2) we need to keep up with any new experiences that may happen along the Telenet trail.

:C1011 CC5 PETER+TRUDY JOHNSON-LENZ (P+T,118) 4/22/80 6:59 AM L:16
KEYS:/TELENET EXPERIENCES/LOCAL NETWORK OUTAGE/NOT OPERATING?/

We tried to log onto EIES at about 3 AM EST this morning. We got the Telenet message LOCAL NETWORK OUTAGE. We checked other "201" computer numbers (20121, 20124, 20126) and all were available and we could connect. Trying to connect to EIES continued to give LOCAL NETWORK OUTAGE. We tried calling long distance direct to Newark (from Portland, Oregon), and we were immediately connected to EIES. Trying again through local Telenet to connect, we got more LOCAL NETWORK OUTAGE and then a series of 20125 NOT OPERATING. Again we called direct to Newark and found EIES up and humming. Again we tried local Telenet and got more NOT OPERATING. Finally, about 6:23 AM EST we got connected to EIES via local Telenet.

While composing the last line, we got frozen on line again by Telenet and then got LOCAL NETWORK OUTAGE when trying to reconnect. Again the other "201" numbers worked. Finally reconnected.

This is not at all unusual.

:C1011 CC6 "CAPTAIN AMERICA" 4/22/80 11:13 AM L:18
KEYS:/GIVEMHELL/

IN THE INTERESTS OF TRUTH JUSTICE AND THE AMERICAN WAY, LET ME SUGGEST THE FOLLOWING:

1. HOW CAN YOU REALLY DETERMINE IF WHAT YOU ARE EXPERIENCING IS REALLY TELENET PROBLEMS?
2. COULD YOUR TERMINAL BE AT FAULT?
3. COULD THE CUT OFF PROBLEM HAVE BEEN IN YOUR LOCAL CENTRAL TELEPHONE OFFICE?
4.COULD THE PROBLEM BE AT THE CENTRAL OFFICE WHERE NJIT IS LOCATED.
5. COULD THE EQUIPMENT AT NJIT HAVE CUT YOU OFF? IT CERTAINLY HAS BEEN DOWN MANY TIMES FOR EXTENDED PERIODS AND IS VERY UNRELIABLE HARDWARE.

WE HAVE BEEN CUT OFF AND FROZE ON LINE DIALING DIRECT MANY TIMES. IT JUST TOO SIMPLISTIC TO BLAME TELENET FOR EVERY PROBLEM YOU FNCOUNTER. CERTAINLY THEY HAVE PROBLEMS, BUT I DONT BELIEVE ANYWHERE NEAR WHAT THEY TAKE THE HEAT FOR. BUT IF IT MAKES YOU FEEL BETTER.......

:C1011 CC7 DANIEL H. CARTER (DAN C.,258) 4/22/80 5:22 PM L:7
KEYS:/WHOS FAULT?/
A: 5

I'VE RDCENTLY HAD EXPERIENCES VERY MUCH LIKE THOSE REPORTED BY 118 IN CC 5. IT'S MUOST IRRIDATING AND SO EARY TO BLAME

TELENET SINCE THEY APPEAR TO BE THE COMMON ELEMENT WHEN THINGS FAIL OR QUIT. I HOPE THAT, IN SOME WAY OR ANNTHER, WE ARE ABLE TO MORE REALISTICALLY DETERMINE WHO OR WHAT IS ACTUALLY AT FAULT, DURING THESE PERIODS OF FPUSTRATION. NOT THAT IT MAKES A GREAT DEAL OF DIFFERENCE, BUT IT COULD BE COMFORTING TO KNOW THAT AT LEAST YOU'RE CUSSING THE RIGHT PARTY!

:C1011 CC8 DANIEL H. CARTER (DAN C.,258) 4/22/80 5:27 PM L:2
KEYS:/WHO?/
A: 7

JUST AS I WAS SAYING, WHO IS RESPONSIBLE FOR THOSE CHARACTER ERRORS IN MY
C1011 CC7?

:C1011 CC9 CHARLES WILLARD (CHARLES,846) 4/22/80 8:38 PM
L:22
KEYS:/MORE HELP REQUESTED/
A: 4

I am not certain that I can resolve the conflict between wanting to be able to present TELENET with so-called proof and not wanting to know in some detail not only the types of experiences but the numbers and degrees.

I have learned something from Peter + Trudy, which is to try other 201 accounts in TELENET to get some idea where the problem lies. I call TELENET service when I have problems at the same times as P+T. Sometimes they can help, sometimes not. This morning, they thought that it would take a person coming into EIES to work to correct the problem, but I found that it was back up again when I dialed in through TELENET about 7:30 a.m.

I have also found that it does not do too much good to be able to tell the TELENET customer service people that EIES itself is alive and well, as learned though direct dialing Newark, although when I find that EIES is also not answering direct dialing -- about one in twenty times -- it at least says that the problem is not TELENET's.

I am ignorant in these matters, and it seems to me it might be helpful for someone to describe in lay terms -- if there be such -- the way that the connection between TELENET and EIES is made. That might provide some greater insights into the problems that we experience and the hope with which we might invest the future.

:C1011 CC10 ART KLEINER (ART,866) 4/22/80 9:51 PM L:29
KEYS:/SOME TENTATIVE ANSWERS/
A: 6

This is not the definitive answer to your questions, Captain America, but I think it will help isolate. Other UCsand implementors who are following this may wish to add their own comments.

1. Basically, we have to try to isolate it down to the cause, as P+T did above in cc5.

2. Enough people using enough different types of terminals have experienced the EXACT same symptoms (and later, after I get permission, I will copy some of the msgs. the UCs have received into this conference) that we can definitely exclude terminals as a cause of the disconnect.

3. I think the same applies to the local telephone office. One would expect the problem to be different in each one. Also, in the local telephone office or on the terminal, it would most likely either 1. not say DISCONNECTED or 2. be possible to dial in immediately after. (My guess.)

4. Usually itis possible to dial direct even when the Telenet link is not operating. The implementors at NJIT have to my knowledge gone over the Telenet-EIES link software several times searching for bugs. Maybe we could get a fuller report from someone on the NJIT staff? (There was one in CHIMO a few weeks back but I agree with Dan C. and Charles that more is needed.

5. Perhaps the equipment DOES need to be checked out. But users of OTHER networks have experienced the same symptoms. Including, in my own direct experience, the Source and the I.P. Sharp network. A report by Robert BBezilla in a recent issue of CHIMO confirmed this.

(I hope also to correspond with other members of the Telenet User's Group.)

Captain A., to my knowledge you are the only person who has complained about being disconnected from EIES during a dial-in direct. Can you provide more information on exactly what happens when you are disconnected that way? Does it differ from being disconnected over Telenet? Are there any other direct-dialers who have experienced anything similar? Or who have not?

Thanks. A.
:C1011 CC11 ART KLEINER (ART,866) 4/22/80 9:51 PM L:3
KEYS:/NOT OPERATING/
A: 10

PS - I am dialed in directly while composing this, even tho Telenet reports EIES as "Not operating."

:C1011 CC12 "SKEPTICAL" 4/22/80 11:18 PM L:5
KEYS:/UNTRUTHS/
A: 11

One of the things that bugs me most is when Telenet lies, either
as in
Art's case above (not operating when it is), or even worse when I
phone
them and they tell me the trouble is that EIES crashed, but I can
then
tell them that EIES is up and running since I'd dialed in
directly.
That is NOT what I call customer service.

:C1011 CC13 CHARLTON PRICE (CHARLTON,116) 4/23/80 12:12 AM
L:9
KEYS:/MEANING OF "LOCAL NETWORK OUTAGE" IN PDX-SEA/
A: 5

The pattern P+T report in cc5 is caused -- I am informed repeatedly by Telenet customer service when I reach them in McLean with the (800) number -- that the Portland-Seattle ports (they're linked, and in Portland) are down. In the most recent instance I've encountered of this (about 10 days ago) both the Portland-Seattle ports (through which we're connected) and the New York ports (through which EIES gets a feed) were down at the same time. You also sometimes get a "domino effect" as when much of east coast telenet was knocked out by Hurricane David (+get n1000p267t and then read the Chimo stories on these and other patterns).

:C1011 CC14 CHARLES WILLARD (CHARLES,846) 4/23/80 4:40 AM
L:7
KEYS:/INFORMATION UNDERLOAD/
A: 12

Illustrative of my inquiry for more information is CC12. The report from TELENET "NOT OPERATING" is, in fact, usually a correct statement with regard to the connection between EIES and TELENET. But it would be useful to know more about that connection. I gather that it can sometimes be corrected by the troops at McLean who are there round the clock, and sometimes it cannot.

:C1011 CC15 "CAPTAIN AMERICA" 4/23/80 8:37 AM L:11
KEYS:/PATTERNS/

OK, FAIR ENOUGH. IT WAS MY INTENT TO GET EVERYONE TO LOOK FOR PATTERNS IN THEIR FAILURES AND NOT TAKE POT SHOTS AT TELENET JUST FOR THE HECK OF IT.

ART IN ANSWER TO YOUR QUESTION, WHEN CUT OFF ON DD DIRECT DIAL WE HAVE TO CALL IN AND ASK TO BE KNOCKED OFF LINE JUST LIKE EVERYONE ELSE.

IF YOU CONTINUE ALONG YOUR PRESENT LINES OF INQUIRY IM SURE THE INFORMATION YOU ARE GATHERING WILL BE OF HELP TO EVERYONE IN SOLVING THE PROBLEMS.

:C1011 CC16 ALAN LEURCK (AL,980) 4/23/80 9:02 AM L:56
KEYS:/TELENET/EIES/INTERFACE/

Let me try and give you all a little tutorial on just how EIES and Telenet are hooked together. For those of you that don't know, EIES is running on a Perkin-Elmer minicomputer. It has 512,000 characters of main computer memory and has a maximum area for text storage on our disks of 600,000,000 characters. At the moment we have used around 200,000,000 characters of storage. The hardware was installed in 1975 so it is starting to get outdated.

The EIES computer has two programs in it. One is the EIES system itself and the other is the interface to Telenet. The local lines (201-645-5552) are tied directly into the EIES program. The Telenet lines are tied into the telenet program. There is a common area in the computer's memory, that both programs share, in which they communicate about each Telenet line. With this configuration it is possible for EIES to be up but NOT OPERATING for the Telenet users. This would be caused by a number of problems. One is that the Telenet program on our end has crashed. This is very rare, but does happen. The second reason is that EIES is running very slow and does not communicate with the Telenet program fast enough to allow a connection to be accepted on a Telenet line that was just a few moments ago disconnected. Usually several attempts in a row will gain access to EIES. This is generally the case durring the day. A third reason is that the protocol used to communicate by the Telenet system and our telenet program has been violated by either Telenet or us. This does happen and both sides are at fault in this area. Telenet usually tests its computer network late at night, usually around 2:00 am est. Once that starts we are labled either NOT REACHABLE or NOT OPERATING by Telenet. Many times after they are done testing the net they don't reset the connection between us properly. Usually it does clean itself up around 7:00 am est in the morning. We can reset the line by taking our Telenet interface program out of the system for several minutes, forcing Telenet to assume that we went dead. I've spoken with them several times about this, but the people manning the 800 number don't know anything about our style of interface to Telenet and really can't help. We now have a new salesman for Telenet and I plan on bringing up the subject with him.

The other common complaint is that the system just stops dead or freezes. I believe that this problem is also protocol related, but have yet been unable to replicate it when I am running test just for that problem. I can get the system to freeze on me, but it generally requires me to have been what I term very hostile to the system. It requires that I have entered many carriage returns interdispersed with many break signals. I realize that this is not what is freezing our users. That is why it is very important that you report to me, though this conference if you like, the time of the day (est if you can), the day, the EIES line you were on and the Telenet number you called (don't forget the area code). With that information I can check the logs printed by the telenet interface program and try and get some idea of what is going on. If you don't have time to drop a note in this conference, then please send me a SEND with the above information. If we can figure out just what is causing the disconnects with no time used, we might be able to take advantage of that and thus drop our telenet rates.

As background information to these problems, Telenet is in the process of changing their net from PRIME computers to their own microcomputers. The new microcomputers don't support the style of interface we are currently using to interface to Telenet. Sometime in 1981 we will have to convert over to the style of interfact that the micro's support. For those that care that will be a X.25 style interface. We are currently using the precursor interface to X.25.

:C1011 CC18 ALAN LEURCK (AL,980) 4/23/80 11:28 AM L:3

I have learned from TELENET that the Newark Telenet connection has a computer that has been blowing up power supplies for the past two days. So that is the reason for the problems with Telenet lately.

:C1011 CC19 R COX/R HEROUX/M HEINES (NEIG,739) 4/23/80 1:49 PM L:33

KEYS:/DITTODITTODITTO/

HELLO CONFERFNCE PARTICIPANTS.

I AM VERY GLAD TO SEE THIS CONFERENCE UP AND RUNNING, AS I FEEL THAT EXPLANATION IS CONSTANTLY NECESSARY AS PROBLEMS ARE NOT ALWAYS THE SAME.

I NOTE WITH INTEREST ALL PREVIOUS COMMENTS - IN MY 200 HOURS PLUS OF EIES, DOE, DIALOG, AND BRS SEARCHING I HAVE COME ACROSS ALL THE DIFFICULTIES MENTIONED.

I AGREE WITH CAPTAIN AMERICA'S GENERAL DRIFT - THAT IS, THAT TELENET IS NOT ALWAYS TO BLAME.

I ALSO HAVE ONE UP MY SLEEVE THAT OTHERS MAY OR MAY NOT HAVE EXPERIENCED IN THE PAST. TO WIT: AFTER A HEAVY RAINSTORM HERE IN THE PROVIDENCE, RI AREA OR ANYWHERE IN THE IMMEDIATE VICINITY (IN THIS SENSE FROM NEW JERSEY TO MAINE) I OFTEN HAVE OUTAGES ON ALL SYSTEMS OVER TELENET.

GRIPE #2: MORE PORTS ARE NEEDED. BETWEEN THE HOURS OF 1-4 DAILY I AM USUALLY UNABLE TO COME ONLINE WITH ANY REGULARITY. IF THE BIG BENEFIT OF THE SYSTEM IS ASYNCHRONOUS COMMUNICATION, THEN THAT IS LOST FOR ROUGHLY HALF OF EVERY BUSINESS DAY.CYBERNET ALMOST NEVER HAS THIS PROBLEM, AND WE USE IT FREQUENTLY AS WELL.(OUCH!)

#3. MORE PORTS ARE NEEDED AWAY FROM COSMOPOLITAN AREAS. WE USE TELENET/EIES AS INTEROFFICE COMMUNICATION BETWEEM PROVIDENCE AND OUTLYING OFFICES IN NORTHERN NEW HAMPSHIRE AND MASSACHUSETTS. IN ORDER TO PREVENT OUR EMPLOYEES FROM THROWING THEIR DUMB TERMINALS INTO THE ANDROSCOGGIN RIVER, IT WILL BE ABSOLUTELY ESSENTIAL TO HAVE MORE AND CHEAPER DATA CONNECTS IN MORE WIDELY DISPERSED AREAS.

I MUST ADMIT, I HAVE GOTTEN REASONABLE TO GOOD RESPONSE FROM THE TELENET SERVICE FACILITY IN VIRGINIA. ONE MINOR THING - ONCE, WHEN THE SERVICE PERSON HAD DETERMINED THAT THE PROBLEM WAS ON MY END IN PROVIDENCE, HE GAVE UP. I STILL DIDN'T HAVE ACCESS, AND SINCE I DIDN'T FEEL THAT IT WAS MY JOB TO CALL AROUND ON TELENET'S BEHALF, THE PROBLEM MAY STILL EXIST.

A BILLION DOLLAR INDUSTRY THIS YEAR WITH UNLIMITED GROWTH POTENTIAL? I HOPE SO.

WELL, BACK TO THE CHIMPANZEE/TYPEWRITER INTERFACE.
MIKE
HEINES
NEIG

:C1011 CC25 DOUGLAS A. CAYNE (DOUGAL,218) 4/28/80 12:28 AM
L:44
KEYS:/GLAD TO SEE THIS CONFERENCE/MY HISTORY OF BEING FROZEN-ON/

The extent of how frequently TELENET is freezing people on lately is all the more painfully driven home by the number of people who have been frozen on just while reading this conference. This, my first time accessing C1011, I was frozen-on in the middle of printing out cc16. That is the first time I have been frozen-on while receiving output; I am usually frozen on while the system is waiting for input, i.e., while I'm in the scratchpad or while I'm answering a CHOICE? prompt.

I am frozen-on roughly 60-70% of the time I access EIES, which is an average of about 3 times a day. I live on a borderline between area codes, and thus can use both the Palo Alto, CA and San Jose, CA TELENET offices as a local call. Very often, when one freezes me on and will not allow me to re-connect, the other operates perfectly. Sometimes they both go out simultaneously.

The usual pattern of my experiences is that I will be frozen on, hangup and redial the same TELENET number, and get no response to c20125 for about 5 minutes. After those 5 minutes, I will often get 201 25 NOT OPERATING for about 2 minutes before I can again be connected. Once connected, my id is usually ALREADY IN USE. To combat this, I have +STO (Set Time Out) to five minutes, which reduces my dependency on EIES personnel to bump me off. But it has the adverse side-effect of forcing me to type something at least once every five minutes to avoid being signed off.

Although I have little explanation for most of my being frozen on (other than what I have learned from this conference), when I am using EIES around 2am, either local Californian or Eastern time, most freezing-on seems to be due to TELENET going down for maintenance of what have you. When they shut down, it's much like being frozen on, but you can't re-dial. I'd think it would be possible for TELENET to broadcast a message saying they will shut down in 5 minutes, rather than simply bumping everyone who happens to be on without allowing them time to finish what they are doing and sign off.

I have been extremely dissatisfied with TELENET lately, and am all the more perplexed because I never had any of these problems even once until just a few months ago

I'm glad to see this conference providing a place to air our complaints and to discuss ways to deal with these problems. I'm grateful to Al for his clear presentation of the basic hardware/software issues involved. I also agree wholeheartedly with Richard Holbrook's suggestion of providing users with an alternate ID-form that would have EIES bump the ID if it is currently in use; the software implementing such an alternate code could easily be structured to prevent someone actually and currently using (i.e., currently typing or reading) the number from being bumped.

I'd be interested in hearing any ideas about why these problems should have started and become so severe in the past couple months while they were practically non-existent up until now...

:C1011 CC26 R COX/R HEROUX/M HEINES (NEIG,739) 4/29/80 1:34 PM L:7
KEYS:/RELIABILITY/

IT HAS OCCURRED TO ME, SOMEWHAT AS AN AFTERTHOUGHT WHILE DISCUSSING CC WITH NON-CC TYPES, THAT THERE IS ONE THING THAT IS VERY BASIC TO THIS DISCUSSION. REGARDING NON-CC TYPES WHO COULD BE POTENTIAL CCERS: THEIR MAIN CRITICISM IS THAT CC HAS NOT SHOWN THEM THAT IT IS AS RELIABLE AS MAKING A SIMPLE TELEPHONE CALL. HOW MANY PEOPLE HAVE BEEN FROZEN IN MID-WORD WHILE MAKING A TRANSATLANTIC TELEPHONE CALL? COMMENTS, PLEASE.

MIKE
HEINES
NEIG

:C1011 CC28 MURRAY TUROFF (MURRAY,103) 5/ 1/80 5:29 PM L:28
KEYS:/RELIABILITY/
A: 26

With respect to computer services over termnals in general the question of reliabilty is all over the map. Computers do crash and this generation is still very subject to that sort of thing regardless of the service. There are a few systesm that have made the proper investment in reliablity and I think GE Time Sharing has a very good record in this regard from what I have heard. With sufficent funds the problem can be taken care of but the results will be reflected in user costs.

EIES has actually gone a long way towrd reliabiity in the sense of recovering from errors in a few seconds and almost total automatic operation fro long periods of time. Most of our prolbems at the moment are with the changing nature of teleent and the fact that they do not tell us any more about what they are doing then they tell most of you. Also if any of their changes are giving problems to our software then we can not reprogram in a few hours, it may take weeks.

One solution is for us to pay another 12,000 a year and use therre hardware interface which then has the merit of putting the whole responsibilty upon them for these problems with out quesiton. That means raising our teleent charges. If the situation keeps up we will have no other course.

EIES itself is a pilot system devolted to field trials of this technology and to exploring it. It is always going to have somewhat less reliabity then the properly deisgned commercial system. On the other hand, it is about a half the costs of using such a ysstem.

In terms of the users we would like to see being able to try the system and make use of it I think that keeping the xost low has to remain a dominent factor.

Yes phone calls are more reliable interms of making the phone call whenever you want it. (except perhpas in certain countries and certain rurual area and NY city at certain times). However, the party your phoneing may not always be there and the cost of a phone call is considerably more than the cost of eies if it is between cities.

On a cost basis eis is more comparable to mails and possibly has as good reliablity.

There is a very dedicated group on this end which does its best but one has to relaize that the degree of reliabity of a system is still a strong function of the cost once you get over the 90% mark. I think we are over that mark at least.

:C1011 CC29 DAVID L. JONES (DAVE J,755) 5/ 2/80 12:34 AM L:36
KEYS:/CAN'T GET ON TELENET SOMETIMES/

Just got the printout of the first 28 comments in this conference, and believe it or not, wasn't tossed off the system during all that time. There's one thing that has been happening lately here in Hawaii that I don't believe anyone has mentioned thus far (though I might have missed it--have just scanned the printout quickly). On several occasions during the past week, I have dialed TELENET, got the tone OK, but on doing the {CR};{CR} sequence absolutely nothing happens. This first happened on Saturday afternoon, April 26, when I was attempting to demonstrate the system to a friend. I wondered if something was wrong with my terminal or modem, but doubted that seriously, since I have an automatic dialer thru which I can listen to the sounds, and I could hear the pulses when I was typing. Saturday evening I got on EIES with no difficulty. Then when I tried again Monday evening, the same thing happened--got TELENET tone, but no other response. The next day I phoned John Southworth (HAWAII) to ask him if he'd had that happen, and he said it had, several times. Tuesday and Wednesday evenings (Hawaii time) I tried several times during the course of each evening, and both evenings consistently got the 201 25c NOT OPERATING reply. So this is the first time I've been on EIES this whole week! The only time I have available is in the afternoon and evening, Hawaii time, which would be sometime between 11:00 p.m. and 3:00 a.m. Eastern Daylight Time. Usually this is very good, since normally there are very few on-line and response time is excellent.

Incidentally, most of the times when I've been cut off in mid-sentence it has been when I've been in the scratchpad composing a message or conference comment; only once or twice have I been cut off when receiving anything. And when cutoffs occur, they are quite sudden and without any "abuse" on my part--i.e., no breaks or multiple {CR}'s. I usually try a {BREAK} just to see if I'm really cut off, after an unusually long pause with nothing happening. If {BREAK} doesn't print, then I know I'm really off. I, too, have set my Time Off to 5 minutes, so I wouldn't have to wait 20minutes to get back on. This has been no hardship; I don't have to type anything every 5 minutes--if I'm receiving a printout, it has the same effect. I can't think of any occasion when I've been on the system that I have been inactive for 5 minutes at a time; 3 minutes might be even better, come to think of it.

:C1011 CC31 PETER+TRUDY JOHNSON-LENZ (P+T,118) 5/ 2/80 2:33 PM L:46
KEYS:/MANY PROBLEMS/

About 4:45 AM we were trying to transmit one message from our micro to EIES. We logged on the system and after the normal log in sequence got ***POSSIBLE DATA LOSS*** which was strange because we weren't transmitting yet. We disconnected and tried to come back again. EIES didn't recognize our number and code this time, so we entered it again. It worked the second time. We finally got into the SP and transmitted the message. (We've been transmitting without transmission errors for almost a year now.) We noticed that an extra line had crept in somewhere, so we checked the message after it was sent and found it had some control and other garbage characters. We then copied the message into the SP for editing, and when we asked the system to go to line 2 (with =2), it printed out the contents of lines 2-6 without moving us to line 2. Then another freeze when the system didn't do anything. We got back to Telenet and tried to reconnect. Again EIES didn't recognize our number and code the first time but did the second.

We decided to try to transmit the message over again, to try to eliminate the transmission errors. We did, and there were more control and other funny characters. Again we got ***POSSIBLE DATA LOSS*** so we disconnected. We reset our micro to start over and dialed another local Telenet number and then tried again. Again EIES recognized our name&code only on the second try, and we again got frozen on line with nothing happening. We finally decided to give up on fixing the message after half an hour of this and decided to get our waiting messages. We got one and part of a second (both dealing with someone's else's similar Telenet problems) and then the system froze again. This time when we disconnected and tried to reconnect, we got 20125 LOCAL NETWORK OUTAGE. At this point we gave up.

Throughtout this whole experience, EIES was up and there were people on line working. We had used the system with no difficulty early in the evening, so we conclude that the later problems were all due to Telenet.

-- !L Many of thme problems have just recurred during the last half hour trying to transmit this and a couple of messages. In fact, in adding this current note, we used control x to cancel a line and immediately got TELENET and the @

sign. When we entered c 20125, we were right back in the SP. We had the same difficulty with having to log on twice to get in and had several experiences of *POSSIBLE DATA LOSS*. Again, to try to prevent the problems, we reloaded our transmit program, hit the phone receiver a couple of times to rearrange the crystals, and called Telenet anew. These problems make it really difficult to get much work done. Even as we entered this last line, the system froze, we got back to Telenet, and then got 201 25 NOT RESPONDING. After calling another Telenet number, we finally got reconnected. Not wanting to push our luck any further, we will refrain from further comment.

:C1011 CC33 PETER+TRUDY JOHNSON-LENZ (P+T,118) 5/ 2/80 8:03 PM L:50
KEYS:/SWITCHED PACKETS/FEAR AND LOATHING ON TELENET/
A: 31

Here is another example of a Telenet problem. It looks like some packets got switched somewhere along the line.

We were in the SP on line 1. We entered a personally defined command, +consult, to go through a set of conferences. Instead of the command executing, we got a line feed and then EIES responded with COMPOSE CHOICE?. We then entered ++8 to get back in the SP. Upon entering, we were on line 2. Being curious, we entered :1 to print out line one. But the system froze and nothing happened. After a while we pressed BREAK and got ***POSSIBLE DATA LOSS***. Then we disconnected with and then reconnected.

When we got back in the SP, line 1 was printed out. It said PASSWORD (PASS)? -- WHICH IS NOT FROM EIES!!! Where did that come from??

Several times earlier today, we have entered commands and gotten weird results. For example, on as 110 long enough to bump 118 because of being stuck on line, we entered +o and immediately got NO MESSAGES WAITING as the response.

Just now, in trying to print out the SP with :- the system froze again. After a long pause, we pressed CR and got ***POSSIBLE DATA LOSS***. So we disconnected and then reconnected. And this is the new "garbage" we found in the SP from out of nowhere:

```
18:MER NAME LINE2.... BELL TELCO
19:
 CUSTOMER ADDRESS LINE1. 8 SOUTH 2ND AVE
20:
 CUSTOMER ADDRESS LINE2.
21:
 CUSTOMER
```

Then we tried to delete lines 18 on with *18- and got line 19. We tried to delete them again. Then on line 18 we entered =10 and got ***PDL*** again. So we disconnnected and then reconnected. When we came back in this time, after the usual log on, we got this random packet:

462

TI - ANKYLOSING SPONDYLITIS AND INFLAMMATORY BOWEL DISEASE. II.

PREVALAENCE OF PERIPHERAL ARTHRIT

Then we disconnected again and got 201 25 NOT RESPONDING. Then we got connected but had to log in twice (as mentioned in cc31) since the first time didn't "take." After the usual EIES signon messages we got 201 25 DISCONNECTED (with no time or packet numbers). Then we tried to reconnect and got 201 25 NOT RESPONDING. Then got connected and again had to try twice.

Question: whose packets did we get and where did ours go?

If we weren't so addicted and persistent, we would have given up long ago.
:C1011 CC35 DOUGLAS A. CAYNE (DOUGAL,218) 5/ 3/80 5:53 PM
L:21
A: 29
Of the two TELENET exchanges I use regularly, one has been cutting me off all day. Rather than simply freezing me on line, the TELENET carrier just went dead and I was disconnected. But, was not frozen onto EIES. That is, I could redial and not get Sorry, that ID is already in use.

In re Dave J's cc29 about sometimes getting no response to the opening {CR};{CR}, I have that problem fairly often. I've found, however, that typing a string of control-Q's will produce a bit of gibberish, after which TELENET will response properly to the {CR};{CR}.

Does anyone have any idea why TELENET problems have increased so dramatically in recnent months? Is it simply because the level of demand and use so greatly exceeds what TELENET expected? Are people having similar problems on other value-added networks? And if the problems are primarily due to overload, does TELENET have any immediate plans for expanding their services to accomodate the greater load?

If the networks can do no better than offering this sort of consistently poor--borderline unusable--service, it may be many more years than we've been predicting before we become the Network Nation, or before people find computers useful enough to have in the home...
:C1011 CC46 ALAN LEURCK (AL,980) 5/ 6/80 11:00 AM L:18
KEYS:/TELENET/NET/CHANGES/FOR/THE/BETTER???/
Well I got a little bit of a run down from one of the technical support people in Telenet. We covered two areas. The first was the portland oregan area. The problem there seems to have been tracked down to the dial in ports only. It seems that there was some problem with terminal handling software that was completly screwing up some of the inportant fields as to who was attached to where and the type of terminal that they were using. The software was corrected (seems to have been a bug) and I think that all is working well now.
The other problem has been in Newark. Seems that some of

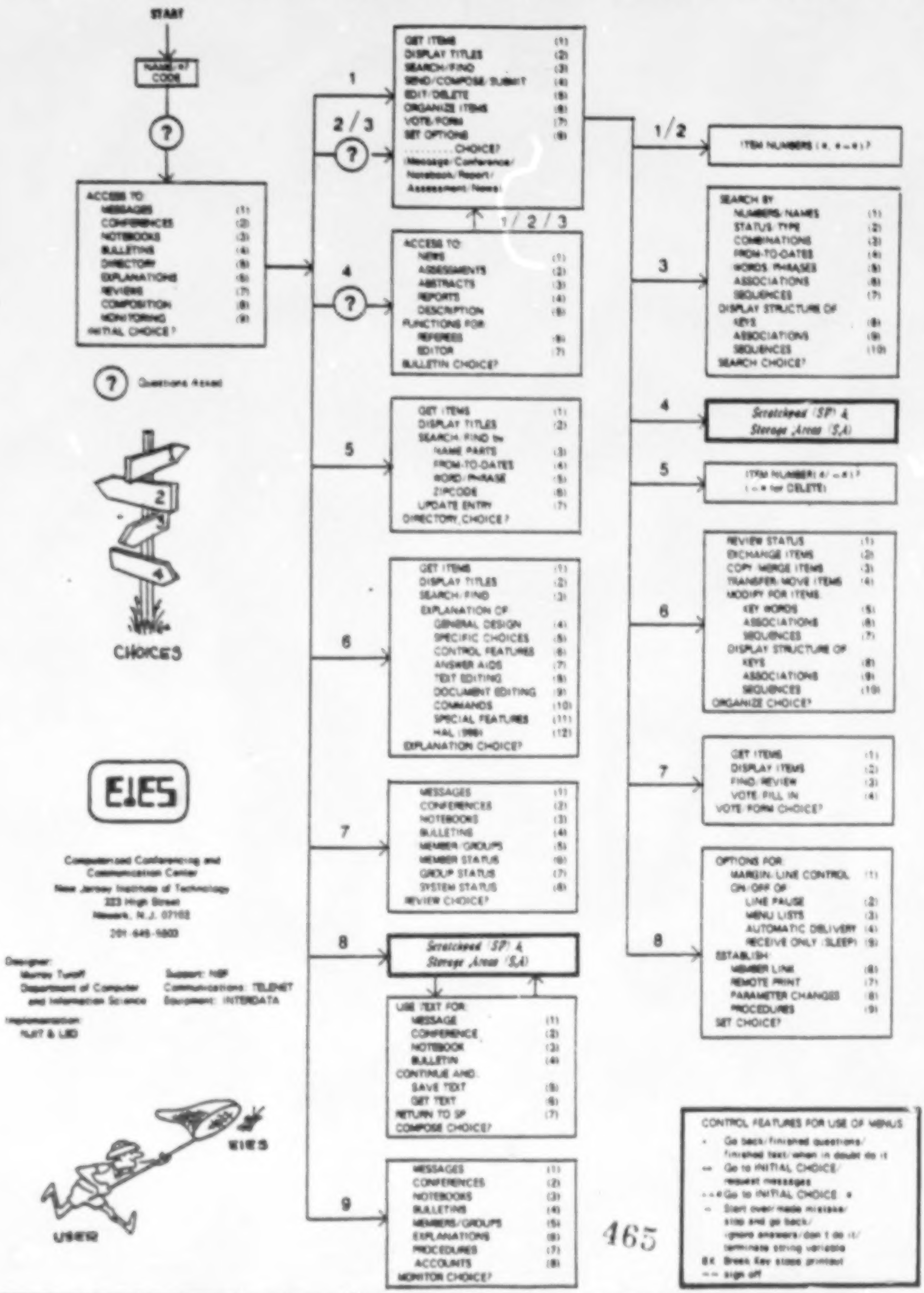
```
the host computers in New Jersey were using a very dumb
interface to Telenet that required Telenet to take all the
characters typed into the net and pack them together into a
single unit and send it out over their net.  This effort
required a lot of computer muscle.  EIES is also tied into the
same computer that these other hosts are using.  Apparently so
much muscle was required that they were unable to handle the
entire load under heavy conditions.  The very dumb interfaces
have been removed from the computer we use and placed on their
own computer.  So hopefuly a large number of our problems should
go away.  Please keep you comments comming!
:C1011 CC47  (ANONYMOUS)   5/ 6/80   1:08 PM  L:0
KEYS:/THANK YOU FOR YOUR EFFORTS/
A: 46

:C1011 CC49  EDWARD M. HOUSMAN (GTE,215)   5/ 8/80  10:54 AM  L:4

TELCO ALERTED ME TO THIS CONFERENCE, AND I WILL BE DROPPING IN
FROM
TIME TO TIME.  NOW THAT THE GTE CORPORATION IS POURING MILLIONS OF
DOLLARS INTO TELENET AND RELATED TELECOMMUNICATIONS BUSINESS AREAS
TELENET SERVICE SHOULD CONTINUE TO IMPROVE.
:C1011 CC51  "PANCHO"   5/ 9/80   3:50 PM  L:3

RE:CC 49. "SHOULD CONTINUE TO IMPROVE" WHAT IS THIS SUPPOSED TO
MEAN?
SOUNDS LIKE MIDDLE MANAGEMENT DOESN'T KNOW WHAT'S HAPPENING TO THE
TROOPIES.
```

USER'S GUIDE FOR ELECTRONIC INFORMATION EXCHANGE SYSTEM



ACCESS TO:
MESSAGES (1)
CONFERENCES (2)
NOTEBOOKS (3)
BULLETINS (4)
DIRECTORY (5)
EXPLANATIONS (6)
REVIEWS (7)
COMPOSITION (8)
MONITORING (9)
INITIAL CHOICE?

? Questions Asked

GET ITEMS (1)
DISPLAY TITLES (2)
SEARCH/FIND (3)
SEND/COMPOSE/SUBMIT (4)
EDIT/DELETE (5)
ORGANIZE ITEMS (6)
VOTE/FORM (7)
SET OPTIONS (8)
.... CHOICE?
(Message/Conference/
Notebook/Report/
Assessment/News)

ACCESS TO:
NEWS (1)
ASSESSMENTS (2)
ABSTRACTS (3)
REPORTS (4)
DESCRIPTION (5)
FUNCTIONS FOR
REFEREES (6)
EDITOR (7)
BULLETIN CHOICE?

GET ITEMS (1)
DISPLAY TITLES (2)
SEARCH/FIND by
NAME PARTS (3)
FROM-TO-DATES (4)
WORD/PHRASE (5)
ZIPCODE (6)
UPDATE ENTRY (7)
DIRECTORY CHOICE?

GET ITEMS (1)
DISPLAY TITLES (2)
SEARCH/FIND (3)
EXPLANATION OF
GENERAL DESIGN (4)
SPECIFIC CHOICES (5)
CONTROL FEATURES (6)
ANSWER AIDS (7)
TEXT EDITING (8)
DOCUMENT EDITING (9)
COMMANDS (10)
SPECIAL FEATURES (11)
HAL (98) (12)
EXPLANATION CHOICE?

MESSAGES (1)
CONFERENCES (2)
NOTEBOOKS (3)
BULLETINS (4)
MEMBER/GROUPS (5)
MEMBER STATUS (6)
GROUP STATUS (7)
SYSTEM STATUS (8)
REVIEW CHOICE?

Scratchpad (SP) &
Storage Areas (SA)

USE TEXT FOR:
MESSAGE (1)
CONFERENCE (2)
NOTEBOOK (3)
BULLETIN (4)
CONTINUE AND:
SAVE TEXT (5)
GET TEXT (6)
RETURN TO SP (7)
COMPOSE CHOICE?

MESSAGES (1)
CONFERENCES (2)
NOTEBOOKS (3)
BULLETINS (4)
MEMBERS/GROUPS (5)
EXPLANATIONS (6)
PROCEDURES (7)
ACCOUNTS (8)
MONITOR CHOICE?

ITEM NUMBERS (#, #-#)?

SEARCH BY
NUMBERS/NAMES (1)
STATUS/TYPE (2)
COMBINATIONS (3)
FROM-TO-DATES (4)
WORDS/PHRASES (5)
ASSOCIATIONS (6)
SEQUENCES (7)
DISPLAY STRUCTURE OF
KEYS (8)
ASSOCIATIONS (9)
SEQUENCES (10)
SEARCH CHOICE?

Scratchpad (SP) &
Storage Areas (SA)

ITEM NUMBER(#/-#)?
(-# for DELETE)

REVIEW STATUS (1)
EXCHANGE ITEMS (2)
COPY/MERGE ITEMS (3)
TRANSFER/MOVE ITEMS (4)
MODIFY FOR ITEMS
KEY WORDS (5)
ASSOCIATIONS (6)
SEQUENCES (7)
DISPLAY STRUCTURE OF
KEYS (8)
ASSOCIATIONS (9)
SEQUENCES (10)
ORGANIZE CHOICE?

GET ITEMS (1)
DISPLAY ITEMS (2)
FIND/REVIEW (3)
VOTE/FILL IN (4)
VOTE/FORM CHOICE?

OPTIONS FOR:
MARGIN/LINE CONTROL (1)
ON/OFF OF
LINE PAUSE (2)
MENU LISTS (3)
AUTOMATIC DELIVERY (4)
RECEIVE ONLY (SLEEP) (5)
ESTABLISH:
MEMBER LINK (6)
REMOTE PRINT (7)
PARAMETER CHANGES (8)
PROCEDURES (9)
SET CHOICE?

CONTROL FEATURES FOR USE OF MENUS
. Go back/finished questions/ finished text/when in doubt do it
← Go to INITIAL CHOICE/ request messages
--#Go to INITIAL CHOICE #
– Start over/made mistake/ stop and go back/ ignore answers/don't do it/ terminate string variable
BK Break Key stops printout
— — sign off

Computerized Conferencing and
Communication Center
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Designer:
Murray Turoff
Department of Computer
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Support: NSF
Communications: TELENET
Equipment: INTERDATA

Implementation:
HUIT & LIED